

Exhibit LL
Attachment 1
Part 1 of 2

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Maxine Mine, Alabama
Sampling and Investigation Report
October 17, 2017

Overview

At the request of the Southern Environmental Law Center (SELC) and Black Warrior Riverkeeper (BWRK) I have been conducting water and sediment sampling at the former Maxine Mine waste disposal site located along the Locust Fork of the Black Warrior River near river mile 390.5 about five miles upstream of its confluence with the Mulberry Fork. This can be found on the Gilmore, AL USGS 7.5 minute quadrangle topographic map, a portion of which is shown below in Figures 1 & 2 from the 1971 edition.

Figure 1

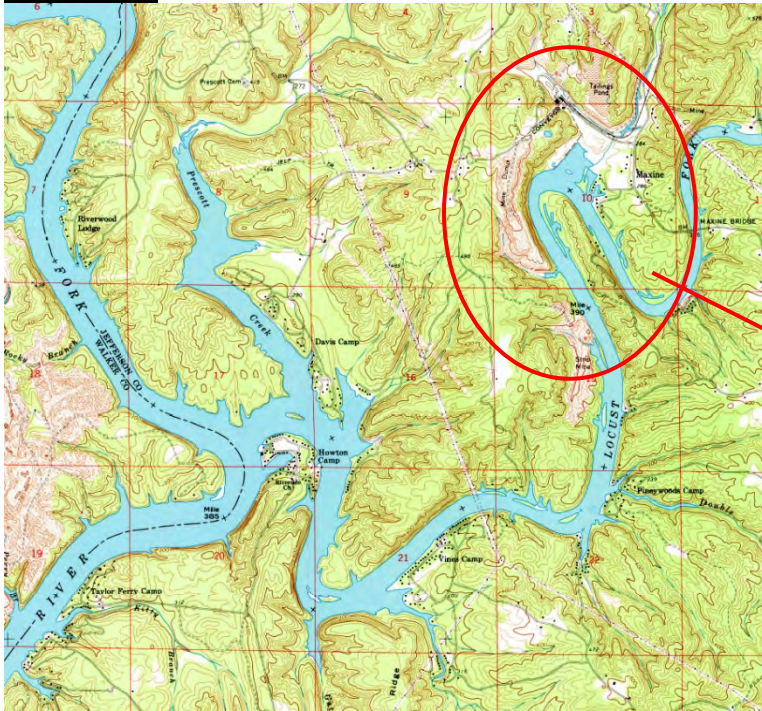


Figure 2



Sampling was conducted on September 20, 2016, August 1, 2017, and August 16 – 18, 2017. On the first sampling trip, I was accompanied by Johnny Kinney of BWRK and Frank Chitwood, and water and sediment samples were taken only along the river bank with access by boat. The following year split sampling was done in August 2017 with representatives from site owner Drummond. These samples were taken on site as well as in and along the river and included chemical as well as toxicity analyses, along with field testing for physical parameters conductivity, pH, and temperature.

All samples were collected consistent with state and EPA protocols in laboratory provided containers, with supplied preservatives added as required for given parameters, using new gloves at each site, filtered in the field as needed, and placed into ice chests for delivery with Chain of Custody forms maintained for all samples. The September 20, 2016 samples were shipped by FedEx the same day to Pace Analytical lab (Pace), except for the pH samples which I delivered the following morning to Sutherland Environmental lab in Birmingham. For the sampling in August 2017, all samples were shipped by FedEx to Test America lab, after site-specific, detailed plans and procedures prepared by Aquilologic (and described in Anthony Brown's report for this case) were implemented. Also for the August 2017 sampling, procedures were agreed upon, followed, and observed in concert with Drummond representatives who were conducting Drummond's sampling.

Figure 3 – Sample Locations September 20, 2016

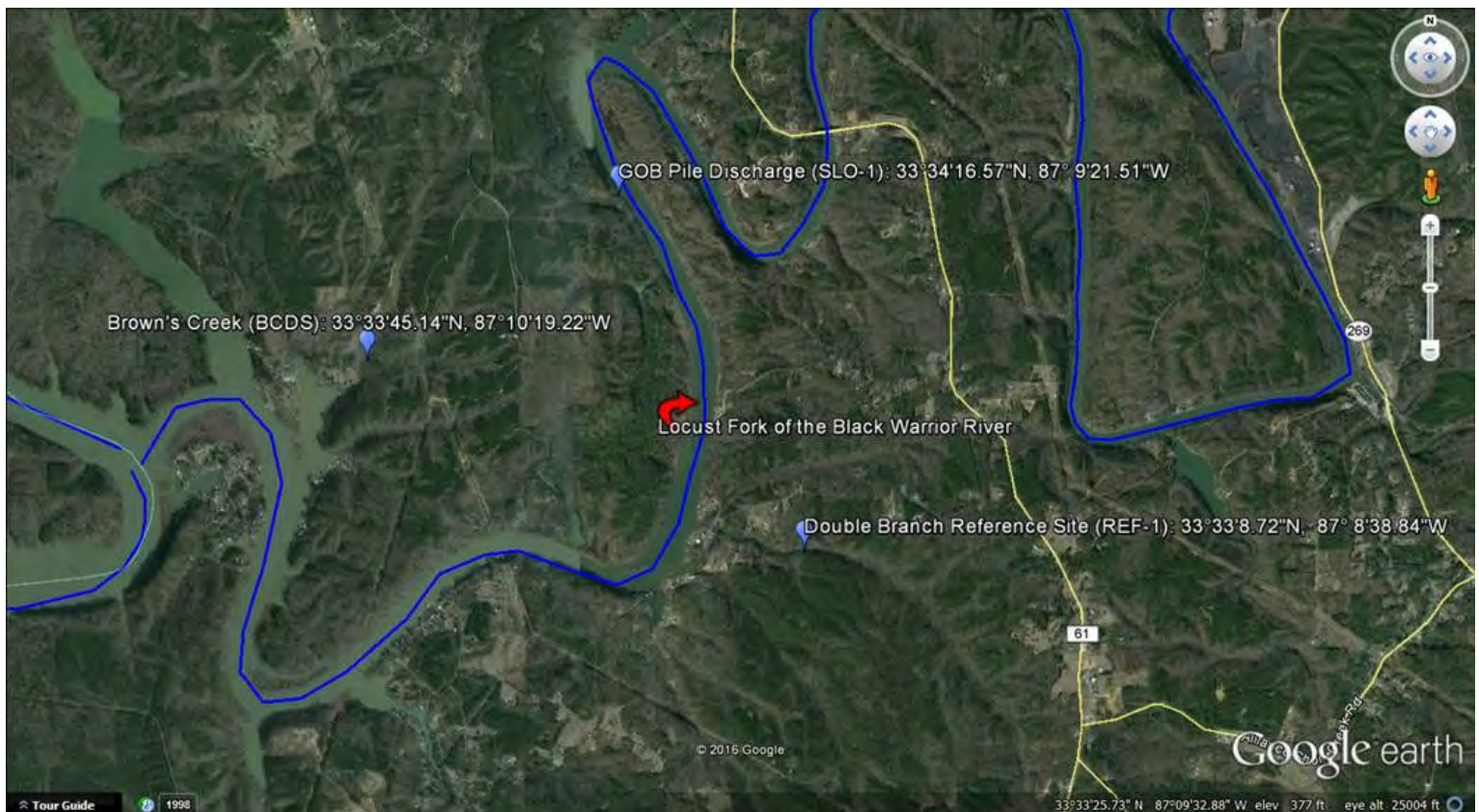
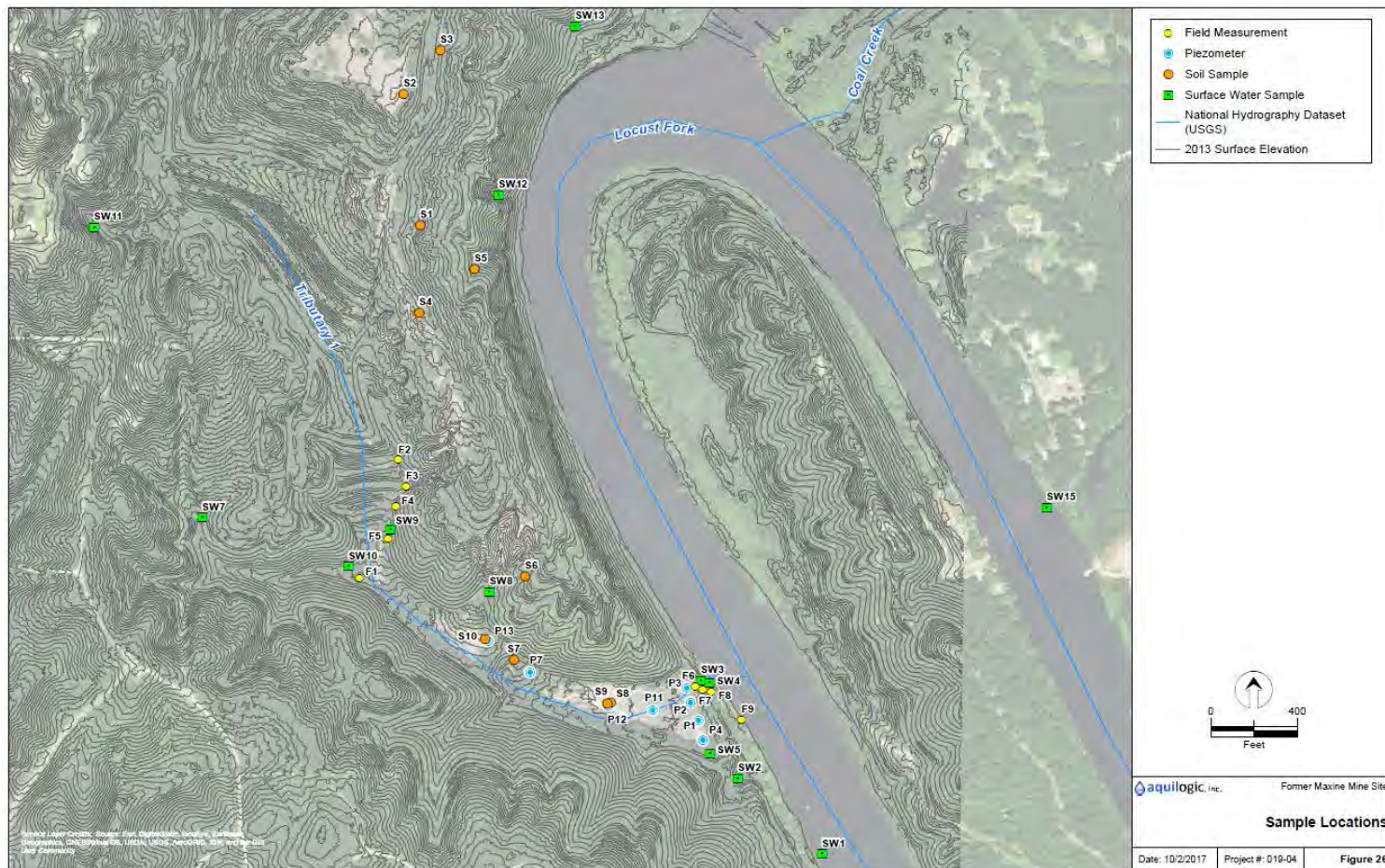


Figure 4 – Sample locations August 2017

Sample locations were identified by numbers assigned by Aquilogic as shown on the map above in Figure 4 prepared by Aquilogic.

Field Observations & Data

Field readings for conductivity, pH, and temperature were done using a Hach HQ30d meter with CDC40115 conductivity probe and PHC101 pH probe. Field measurements were taken during the August 2017 visits; no field measurements were taken on the September 20, 2016 visit. Calibration was conducted before and/or after each field visit in August 2017 when field measurements were taken. My field notes for the August 2017 visits are attached as Attachment 2.

Field parameters for measurements I took during both of the August 2017 surveys are presented below in tables prepared by Aquilogic. Values in bold indicate an exceedance of 2011 EPA guidance of 300 $\mu\text{S}/\text{cm}$ for conductivity (see <https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=233809>) and values in gray cells in bold

indicate a violation of Alabama Water Quality Criteria set forth at Alabama Administrative Code 335-6-10, and EPA regulations at 40 CFR Part 434.

Table 1

Site ID	Day dd-mmm-yy	Time hh:mm	Conductivity uS/cm	Conductivity Probe Temperature degrees F	pH pH units	pH Probe Temperature degrees F
SW2	01-Aug-17	10:45	1,083	70.8	6.43	69.2
SW3	01-Aug-17	11:40	3,530	86.3	2.79	86.9
SW4	01-Aug-17	12:05	3,400	72.5	3.48	74.8
SW5	01-Aug-17	15:20	1,177	76.2	3.50	76.0
SW8	01-Aug-17	13:45	9,490	84.2	2.73	83.6
SW9	01-Aug-17	14:15	8,170	80.2	2.53	79.6
SW10	01-Aug-17	14:40	47	79.9	5.53	81.7

Table 2

Site ID	Day dd-mmm-yy	Time hh:mm	Conductivity uS/cm	Conductivity Probe Temperature degrees F	pH pH units	pH Probe Temperature degrees F
SW1	18-Aug-17	15:50	264	90.8	9.17	89.3
SW2	16-Aug-17	11:45	1,044	71.1	5.66	71.0
SW3	16-Aug-17	12:40	3,150	93.4	2.71	92.4
SW4	16-Aug-17	12:48	3,310	68.9	3.61	70.3
SW5	16-Aug-17	12:15	1,117	76.9	3.23	76.2
SW7	16-Aug-17	16:15	70.2	73.9	5.40	72.9
SW8	16-Aug-17	14:15	8,020	80.6	2.88	87.2
SW9	16-Aug-17	14:30	8,220	83.8	2.54	84.4
SW10	16-Aug-17	14:50	48.8	81.4	5.32	81.0
SW11	18-Aug-17	11:35	109.5	74.4	5.35	74.5
SW12	18-Aug-17	15:10	6,680	79.1	2.26	78.9
SW13	18-Aug-17	13:55	4,970	80.3	2.42	79.2
SW15	18-Aug-17	15:35	267	88.6	9.14	88.9

Conductivity is an indication of mineral or pollutant content of water, and commonly used as a reliable scientific method to identify potential areas of contamination.

(<http://water.epa.gov/type/rsl/monitoring/vms59.cfm>) Background or uncontaminated areas would have conductivity generally in the range of up to 300 μ S/cm depending on the natural or background conditions of the local geology and water. pH is a measure of how acidic or basic water is, with 7 being neutral, lower than 7 being more acidic, and higher than 7 being more basic (or alkaline) on a scale of 0 to 14.

(<https://archive.epa.gov/water/archive/web/html/vms54.html>)

From the field it can be seen that the impacted waters at the Maxine site are extremely contaminated by substances related to both conductivity and pH. Background or reference

readings were taken at one river location and three near or on-site locations that are upgradient and/or appear unimpacted by runoff or water flowing through the waste. These were:

- SW2 a small stream just south of the waste site that may be impacted by other mining
- SW7 a spring that flows to a pond in a hollow on west side of site
- SW11 a spring past the power line, west of the waste pile, that flows toward the main stream through site (aka Tributary 1)
- SW15 Locust Fork about two miles upstream from the site

None of the above four sites are completely unimpacted or pristine, but can be useful for comparison with sites receiving flow from the mine waste. SW2 likely receives flow from other mining areas, and the springs at SW7 and SW11 appear to be downgradient from disturbed areas of the Maxine site other than where waste is located. The site upriver at SW15 is above the Maxine waste site, but is downstream from other area mining and disposal activities.

These four sites had conductivity ranging from 70.2 to 1,083 $\mu\text{S}/\text{cm}$ (average of 514.7 $\mu\text{S}/\text{cm}$) – or excluding SW2 with apparent mining impacts, from 70.2 to 267 $\mu\text{S}/\text{cm}$ (average of 148.9 $\mu\text{S}/\text{cm}$) – as compared to impacted waters with conductivity from 1,044 to 9,490 $\mu\text{S}/\text{cm}$ – up to over 100 times higher. Similarly, the pH for the on-site background sites was relatively neutral with impacted waters much more acidic with several pH values measured below 4 and some less than 3 pH.

Sample Results

1. September 20, 2016

Limited samples were taken along the river on September 20, 2016. The samples were taken between 10:45 am and 12:15 pm at the main discharge from the Maxine waste site, identified as SLO (for slough) on this date (near site SW4 used in August 2017), and at a reference site in a tributary cove across the river, identified as REF. See Figure 3 above for sampling locations.

Samples were shipped by FedEx at 6:00 pm the same day to Pace lab except for pH which was taken to Sutherland lab in Birmingham the next morning. Results from samples taken on this date are given in Tables 3 and 4 below, and the lab reports can be found at Attachment 3.

Table 3 – September 20, 2016 Water – Total Metals

	SLO1 9/20/16	REF1 9/20/16
Aluminum	247 mg/L	ND
Antimony	ND	ND
Arsenic	.010 mg/L	.0015 mg/L
Barium	.0075 mg/L	.033 mg/L
Beryllium	.067 mg/L	ND
Boron	.29 mg/L	.021 mg/L
Cadmium	.0013 mg/L	ND
Calcium	281 mg/L	3.2 mg/L
Chromium	.015 mg/L	ND

Cobalt	.43 mg/L	.0011 mg/L
Copper	ND	ND
Iron	385 mg/L	3.8 mg/L
Lead	ND	ND
Lithium	9.6 mg/L	ND
Magnesium	326 mg/L	2.3 mg/L
Manganese	17.8 mg/L	.63 mg/L
Molybdenum	ND	ND
Nickel	.81 mg/L	.0014 mg/L
Potassium	3.8 mg/L	1.9 mg/L
Selenium	.0040 mg/L	ND
Silicon	35.3 mg/L	1.0 mg/L
Silver	ND	ND
Sodium	43.8 mg/L	2.2 mg/L
Strontium	.072 mg/L	.022 mg/L
Thallium	.00056 mg/L	ND
Tin	ND	ND
Titanium	ND	.0015 mg/L
Vanadium	.018 mg/L	ND
Zinc	1.5 mg/L	ND
Mercury	ND	ND
Specific Conductance	5370 μS/cm	95.0 μ S/cm
Total Dissolved Solids	8710 mg/L	15 mg/L
Total Suspended Solids	27 mg/L	22 mg/L
Sulfur	.136 % (w/w)	ND
Trivalent Chromium	ND	ND
TKN	5.0 mg/L	1.4 mg/L
Phosphorus	ND	.091 mg/L
Chloride	1.5 mg/L	2.9 mg/L
Ammonia	4.1 mg/L	.51 mg/L
Nitrate	NA	NA
Nitrate-Nitrite	.099 mg/L	.10 mg/L
Hexavalent Chromium	ND	ND
Cyanide	ND	ND
Total Recoverable Phenolics	ND	ND
Sulfate	6020 mg/L	2.4 mg/L
pH	3.57	6.02
Acidity	NA	NA
Alkalinity	NA	NA

Values in **gray** highlight indicate exceedance of Alabama general, aquatic life (acute or chronic) or human health criteria; note that a single data point is not directly comparable to chronic criteria, but useful for indication of pollution. Values in **turquoise** highlight exceed EPA

recommended criteria. Additionally, values in **bold** significantly exceed reference site conditions indicating violations of antidegradation criteria.

The above data, along with visual observations at the site, clearly show pollutants discharging from the Maxine waste site far in excess of what would be coming from the unpolluted stream that once flowed there, or what would be legally and reasonably allowed under a discharge permit. Most notable are the low pH along with the presence or elevated levels of aluminum, arsenic, calcium, chromium, cobalt, iron, magnesium, manganese, selenium, ammonia, sulfate, and conductivity.



Figure 5
*Maxine tributary flow
into Locust Fork
looking downstream at
sampling location
(9/20/16)*

Regarding arsenic, while it appears that Alabama has not established a safe level of arsenic for human contact (aka swimming, recreation), other states have. For instance, the neighboring state of Tennessee has established a safe level of arsenic for human contact at .010 mg/L (10 µg/L) (see Tennessee Rules and Regulations 0400-40-03). The level found in this limited sampling borders on that amount, which is also much over the reference site level. There is no reason to think that what is unsafe in one state is safe in another just because a criterion has not been established.

Table 4 - September 20, 2016 Sediment

	SLO1 9/20/16	REF1 9/20/16
Aluminum	2780 mg/kg	3690 mg/kg
Antimony	ND	ND
Arsenic	63.6 mg/kg	1.8 mg/kg
Barium	109 mg/kg	53.6 mg/kg
Beryllium	.30 mg/kg	ND
Boron	3.2 mg/kg	ND
Cadmium	ND	ND
Calcium	394 mg/kg	279 mg/kg
Chromium	6.4 mg/kg	4.2 mg/kg
Cobalt	1.4 mg/kg	3.8 mg/kg
Copper	13.4 mg/kg	5 mg/kg
Iron	33500 mg/kg	6740 mg/kg
Lead	11.2 mg/kg	6 mg/kg
Lithium	6.3 mg/kg	4.2 mg/kg
Magnesium	510 mg/kg	328 mg/kg
Manganese	34.5 mg/kg	88.2 mg/kg
Molybdenum	4.4 mg/kg	ND
Nickel	4 mg/kg	5.6 mg/kg
Potassium	1070 mg/kg	307 mg/kg
Selenium	2.3 mg/kg	.33 mg/kg
Silicon	696 mg/kg	1040 mg/kg
Silver	ND	ND
Sodium	460 mg/kg	ND
Strontium	18.3 mg/kg	2.5 mg/kg
Thallium	.35 mg/kg	ND
Tin	ND	ND
Titanium	23.7 mg/kg	28.5 mg/kg
Vanadium	16.1 mg/kg	6.9 mg/kg
Zinc	10.5 mg/kg	18.4 mg/kg
Mercury	.29 mg/kg	.036 mg/kg
Sulfur	.623 % (w/w)	.0531 % (w/w)
TKN	1530 mg/kg	927 mg/kg
Phosphorus	127 mg/kg	114 mg/kg
Chloride	123 mg/kg	274 mg/kg
Ammonia	105 mg/kg	78 mg/kg
Nitrate-Nitrite	ND	ND
Hexavalent Chromium	ND	ND
Cyanide	ND	ND
Total Recoverable Phenolics	1.6 mg/kg	ND
Sulfate	3530 mg/kg	ND

As far as I am aware, there are no sediment criteria established for Alabama. There are various sets of values available from EPA for different programs and uses, some specific to different regions. One way to address this matter and make use of site data is to take an area reference sample for comparison, as done here. While the above data and highlights are limited in number of samples and scope, they are useful as an indication of contamination. Values in **bold** indicate notable elevation over the reference sample.

Contaminants which stand out in the above sediment comparison are arsenic, boron, copper, iron, molybdenum, potassium, selenium, sodium, strontium, mercury, phenols, and sulfate. These further support the opinion that the area of discharge is significantly contaminated by waste at the Maxine site.

2. August 2017

I participated in a site survey on June 12, 2017 with other members of our team and Drummond representatives, but I did not take any samples or field measurements. On August 1, 2017, I participated in a site survey with SELC, BWRK, Brian Dempsey and Drummond representatives that included split surface water (SW) samples with Drummond representatives. Samples were taken between 10:45 am and 3:20 pm, and shipped by FedEx to Test America lab at 7:15 pm the same day. All sample site identifications (ex SW1, SW2, etc.) are as shown on the map above in Figure 4 and used for subsequent sampling later that month. I returned to the site with SELC, BWRK, Wade Major with Aquilogic, Gordon Johnson with Burgess Environmental, Doug MacLean and Chris Slater of Advisian, and Drummond representatives for a three-day site investigation and split sampling August 16, 17, 18. Surface water split sampling was done for chemical parameters on August 16 from 11:45 am to 4:15 pm and shipped to Test America by FedEx to the lab the following day; and August 18 from 11:35 am to 3:50 pm and shipped to Test America by FedEx the same day. On the second day, August 17, only toxicity samples were collected and taken immediately to FedEx for shipping to the lab for testing due to holding time constraints. Analysis of the results of this toxicity testing is being addressed by Dr. Carys Mitchelmore, another expert in this case.

Laboratory tests on the surface water sampling were conducted by Test America Lab located in Pensacola, Florida and laboratory tests on toxicity sampling were conducted by Test America Lab in Corvallis, Oregon. Results for these three dates are shown in Tables below, which were prepared by Aquilogic (see Anthony Brown's tables 9 and 10), and the lab reports are attached as Attachment 4.

Table 5 – August 1, 16 & 18 Dissolved Metals (see larger version at Attachment 5)

Chemical	Units	Freshwater Acute	Freshwater Chronic	Human Health - Consumption of Fish Only	Human Health - Consumption of Water and Fish	Alabama MCL	Site ID	SW1	SW2	SW3	SW4	SW5	SW7	SW8	SW9	SW10	SW11	SW12	SW13	SW15	P3	P12
							Sample Date (dd-mm-yy)															
							18-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17	1-Aug-17
Sample Depth (feet bgs)																						
0.0																						
Aluminum	ug/L	---	---	---	---	200	89	<25	200,000	160,000	27,000	<25	1,500,000	880,000	70	<25	150,000	210,000	<25	120,000	200,000	
Antimony	ug/L	---	---	373	5.5	6	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	
Arsenic (total)	ug/L	---	---	---	---	10	<1.3	<1.3	2.4	11	1.3	<1.3	10	18	6.5	<1.3	2.6	3.2	<1.3	20	2.6	
Barium	ug/L	---	---	---	---	2,000	32	16	11	6.6	34	37	<2.5	<2.5	36	45	<2.5	8.1	33	8.3	2.9	
Beryllium	ug/L	---	---	---	---	4	<2.5	<2.5	34	35	6.4	<2.5	93	88	<2.5	<2.5	47	47	<2.5	31	51	
Boron	ug/L	---	---	---	---	---	<50	<50	77	86	<50	<50	<50	130	<50	<50	200	100	<50	160	140	
Cadmium	ug/L	2.43	1.0	---	---	5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	35	15	<2.5	<2.5	2.7	5.4	<2.5	<2.5	<2.5	
Calcium	ug/L	---	---	---	---	---	24,000	92,000	150,000	180,000	45,000	2,800	300,000	410,000	2,800	5,400	350,000	370,000	25,000	270,000	200,000	
Chromium (total)	ug/L	---	---	---	---	100	<2.5	<2.5	20	8.3	<2.5	<2.5	120	190	<2.5	<2.5	28	31	<2.5	7.8	71	
Cobalt	ug/L	---	---	---	---	---	<2.5	2.8	540	570	140	7.4	3,900	1,800	<2.5	<2.5	670	950	<2.5	580	660	
Copper	ug/L	17.2	11.2	---	1,300	1,000	<2.5	<2.5	75 F1F2	<2.5	<2.5	<2.5	2,300	1,300	<2.5	<2.5	100	160	<2.5	5.5	65	
Iron	ug/L	---	---	---	---	300	<130	<130	20,000	360,000	8,300	<130	470,000	930,000	7,000	<130	210,000	47,000	<130	640,000	91,000	
Lead	ug/L	86	3.3	---	---	15	<1.3	<1.3	<1.3	<1.3	7.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	
Lithium	ug/L	---	---	---	---	---	12	97	2,400	2,500	410	3.2	11,000	13,000	<2.5	3.9	3,400	2,500	12	2,800	3,000	
Magnesium	ug/L	---	---	---	---	---	13,000	39,000	200,000	230,000	52,000	3,000	940,000	640,000	2,100	4,900	530,000	310,000	13,000	330,000	250,000	
Manganese	ug/L	---	---	---	---	50	<13	760	15,000	16,000	5,000	640	69,000	28,000	<13	80	29,000	25,000	<13	18,000	19,000	
Mercury (total)	ug/L	---	---	---	---	2	---	<0.20	<0.20	<0.20	<0.20	---	<0.20	<0.20	<0.20	---	---	25,000	<13	13,000	19,000	
Molybdenum	ug/L	---	---	---	---	---	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	
Nickel	ug/L	585	65	993	411	100	<2.5	4.1	1,100	1,200	220	4	8,200	4,500	<2.5	3.1	1,200	1,700	<2.5	1,300	1,600	
Potassium	ug/L	---	---	---	---	---	2,900	4,300	360	3,600	2,200	1,100	350	<250	1,800	1,100	<250	380	2,900	13,000	890	
Selenium	ug/L	---	---	---	---	50	<1.3	<1.3	2.9	1.5	<1.3	<1.3	10	6.4	<1.3	<1.3	4.6	4.3	<1.3	1.5	3.2	
Silicon	ug/L	---	---	---	---	---	2,300	7,600	56,000	40,000	26,000	5,700	46,000	62,000	6,500	8,600	44,000	46,000	2,500	29,000	48,000	
Silver	ug/L	5.1	---	---	---	100	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	
Sodium	ug/L	---	---	---	---	---	8,300	110,000	34,000	43,000	20,000	3,200	29,000	25,000	2,700	8,300	93,000	34,000	8,300	61,000	42,000	
Strontium	ug/L	---	---	---	---	---	89	1,000	500	480	170	22	420	220	21	34	1,200	1,500	91	490	590	
Thallium	ug/L	---	---	0.27	0.17	2	<0.50	<0.50	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Tin	ug/L	---	---	---	---	---	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	
Titanium	ug/L	---	---	---	---	---	<2.5	<2.5	8.1	9.0	<2.5	<2.5	20	20	<2.5	<2.5	13	11	<2.5	8.6	8.1	
Vanadium	ug/L	---	---	---	---	---	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	11	22	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	
Zinc	ug/L	146	148	14,894	6,158	5,000	<20	<20	2,400	2,600	470	<20	17,000	10,000	<20	<20	3,000	3,800	<20	2,600	3,000	

Notes:

<: not detected at or above the noted reporting limit

---: no criteria or not analyzed

bgs: below ground surface

dd-mm-yy: day-month-year

F1: MS and/or MSD recovery is outside acceptance limits

F2: MS/MSD RPD exceeds control limits

ID: identification (see Figure 20)

MCL: Maximum Contaminant Level

MS/MSD: matrix spike/matrix spike duplicate

RPD: relative percent difference

ug/L: micrograms per liter

uS/cm: microSiemens per centimeter

0.30 bold result indicates a State of Alabama Water Quality Criteria exceedance (see Table 2)

0.30 gray cell indicates a State of Alabama MCL exceedance (see Table 3)

Table 6 – August 1, 16 & 18 Total Metals & Other Parameters (see larger version at Attachment 6)

		SVEI		1981	1982	1982	1981	1981	1980	1980	1980	1980	1981	1980	1980	1980	1980	1980	1981	1981	1981	1981	1981
		Sample Date (dd-mm-yy)												Sample Depth (feet bgs)									
		18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17	
Group	Chemical	Units																					
Total Metals	Aluminum	ug/L																					
	Antimony	ug/L																					
	Arsenic	ug/L																					
	Barium	ug/L																					
	Beryllium	ug/L																					
	Boron	ug/L																					
	Cadmium	ug/L	2.43	1.0																			
	Calcium	ug/L																					
	Chromium	ug/L																					
	Chromium (Hexavalent)	ug/L																					
	Cobalt	ug/L																					
	Copper	ug/L	17.2	11.2																			
	Iron	ug/L																					
	Lead	ug/L	314	4.4																			
	Lithium	ug/L																					
	Magnesium	ug/L																					
	Manganese	ug/L																					
	Mercury	ug/L	2.4	0.012	0.242	0.242	4,700																
	Molybdenum	ug/L																					
	Nickel	ug/L	585	65																			
Potassium	ug/L																						
Selenium	ug/L	20	5	2491	187																		
Silver	ug/L																						
Sulfur	ug/L	5.9																					
Barium	ug/L																						
Chlorine	ug/L	49	100																				
Chromium	ug/L																						
Fluorine	ug/L																						
Iron	ug/L																						
Lithium	ug/L																						
Lead	ug/L	206	339	14,894	4,355																		
Other Parameters	Aluminum, Total	ug/L																					
	Barium, Antimony, Arsenic, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur, Barium, Chlorine, Chromium, Fluorine, Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur	ug/L																					
	Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur	ug/L																					
	Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur	ug/L																					
	Copper, Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur	ug/L																					
	Fluorine, Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur	ug/L																					
	Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur	ug/L																					
	Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur	ug/L																					
	Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur	ug/L																					
	Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur	ug/L																					
	Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur	ug/L																					
	Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sulfur	ug/L																					

Surface water data from these dates consisted of sampling what remains of the stream through the site and at its confluence with the Locust Fork, one side stream just south of the main site, springs/streams on the east face of the site along the river, springs on-site upgradient of waste areas, the river above and below the site, and seepage/streams emanating from the waste dumps.

In looking at these data, most notable are exceedances of state criteria or established federal levels of cadmium, copper, iron, lead, manganese, nickel, selenium, thallium and zinc. For those pollutants which have no criteria or federal guidance level, or for which levels significantly exceed background, pollutants of concern include arsenic, cyanide, nitrogen, phosphorus and sulfate.

Regulatory Issues

Based on the available information, it appears that no permit for the filling, damming or otherwise altering of on-site streams was ever obtained from the state or federal permitting agencies. These activities that have left the site in its present state would have required a 404 permit from the US Army Corps of Engineers and an associated 401 certification from the state of Alabama (per Sections 401 and 404 of the Clean Water Act). Further, it is doubtful that such permit and certification could have been obtained for what was done, as it conflicts with constraints of what is allowed by those regulatory programs. Thus, from my perspective as a former regulator and consultant in that arena, the in-stream waste and fill, and other stream alterations on the site constitute unauthorized activities and ongoing violations.

It is clear from the topographic map in Figure 1 and what is now left on the site that there was at least one stream flowing through the site, which today still partly exists, though in a highly degraded condition. Based on the pre-conditions and current natural remaining contours and springs found at the upper reaches of the site, there may well be other smaller streams on the site that flowed into the primary one, pieces of which appear to still exist.

The stream on the site, referred to as Tributary 1 on the site map above and in related documents, is shown as a dashed blue line (see Figures 1 and 2). This is the USGS symbol for an intermittent stream, or one that may have seasonal or no flow at times or in sections. Along with the adjacent Locust Fork, such streams are still streams in the regulatory sense and are thus protected by the CWA and associated state law and regulations as waters of the US and state. Such waters are to be protected by water quality standards, which consist of three parts: uses, criteria, and antidegradation.

Under the CWA regulatory system, each state establishes designated uses and associated water quality criteria for all waters. These uses and criteria are generally based on recommended guidance published by EPA, which has to approve state uses and criteria, or set them for the state if necessary. Alabama has set designated uses in their regulations (Chapter 335-6-11), with the Locust Fork classified for Public Water Supply, Swimming and Other Whole Body Water Contact Sports, and Fish and Wildlife. A use that is explicitly prohibited by the CWA is waste transport and disposal, as has been done here, where the on-site stream was essentially appropriated and used for such. Even though a stream may flow through private property on its way to larger rivers, it is still a protected public waterway.

For the unnamed stream or streams on the site, the state regulations apply the use classification of Fish and Wildlife per regulations at 335-6-11-.01(5) which states:

(5) Not all waters are included by name in the use classifications since it would be a tremendous administrative burden to list all stream segments in the State. In addition, in virtually every instance where a segment is not included by name, the Department has no information or stream data upon which to base a decision relative to the assignment of a particular classification. An effort has been made, however, to include all major stream segments and all segments which, to the Department's knowledge, are currently recipients of point source discharges. Those segments which are not included by name will be considered to be acceptable for a "Fish and Wildlife" classification unless it can be demonstrated that such a generalization is inappropriate in specific instances.

These uses in turn set the applicable water quality criteria, largely controlled by the Fish and Wildlife use. For many parameters there are numeric criteria set, as shown in Table 5 above, that establish the allowed content of a given pollutant before it is considered polluted. It should be noted that waters should not be allowed to rise in content to just below a given criterion – at the verge of pollution – but rather these criteria are the worst case just prior to pollution, and cleaner conditions must be maintained where they exist. Where no numeric criteria have been set, narrative criteria apply as shown below:

335-6-10-.06 Minimum Conditions Applicable to All State Waters. The following minimum conditions are applicable to all State waters, at all places and at all times, regardless of their uses:

(a) State waters shall be free from substances attributable to sewage, industrial wastes or other wastes that will settle to form bottom deposits which are unsightly, putrescent or interfere directly or indirectly with any classified water use.

(b) State waters shall be free from floating debris, oil, scum, and other floating materials attributable to sewage, industrial wastes or other wastes in amounts sufficient to be unsightly or interfere directly or indirectly with any classified water use.

(c) State waters shall be free from substances attributable to sewage, industrial wastes or other wastes in concentrations or combinations which are toxic or harmful to human, animal or aquatic life to the extent commensurate with the designated usage of such waters.

Thus, regardless of laboratory tests, it is obvious that conditions of the tributary and edge of the Locust Fork at the site clearly violate the narrative criteria.

At times, states set numeric criteria more stringent or lenient than EPA guidance values – or none at all. Though EPA has the authority to overrule weak or missing criteria and set them for the state, that does not often happen and EPA allows the state's weak or non-existent criteria to stand. In such instances the EPA recommended values can at least be used for reference when assessing sampling data to determine if impacts are occurring. Also, criteria from other states that have set values or more stringent criteria can be a guide, such as with arsenic discussed above.

From the records available, it appears that the Maxine waste site had an NPDES permit (although the location of the outfall is unclear) that was terminated in 1992, but has not operated under one since then as required by the CWA for the waste ponds and discharge that have been in place and going on for many years. An NPDES permit would necessarily contain effluent limits based on protection of the receiving stream (water quality based effluent limits) or available treatment options (technology based effluent limits).

EPA publishes effluent limits for most categories of industrial waste including coal mining operations, which can be found in 40 CFR 434. These, along with state criteria, where they exist, and other EPA guidance should have been used to establish a permit for this discharge. However, any permit would also include standard prohibitions that include no deposit of removed substances in public waters, no in-stream treatment of waste, no mixing of wastewater and stormwater prior to monitoring for compliance with limits. Further, an NPDES permit would need to be written so as to protect the uses and criteria of all receiving streams – both the Locust Fork, and the primary receiving stream that flows through the site. Additionally, there are several springs and/or streams on the eastern face of the waste site along the Locust Fork upstream of the mouth of Tributary 1 that are also impacted by the waste and discharging; two of these were sampled on the August 18, 2017 survey and included in the data set as sites SW12 and SW13.

In addition to the uses and criteria discussed, water quality standards always include a critical, and often overlooked third part – antidegradation. Simply put, this is the federally required provision that is often described as what keeps clean waters clean and prevents dirty waters from getting dirtier. Alabama has such a provision in its regulations that is taken from EPA and reads in critical part:

335-6-10-.04 Antidegradation Policy.

(1) The purpose and intent of the water quality standards is to conserve the waters of the State of Alabama and to protect, maintain and improve the quality thereof for public water supplies, for the propagation of wildlife, fish and aquatic life, and for domestic, agricultural, industrial, recreational and other legitimate beneficial uses; and to provide for the prevention, abatement and control of new or existing water pollution.

(2) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. Uses and the water quality to support such uses were established through public participation in the initial establishment, and periodic review, of water quality standards. Should the Department determine that an existing use is not encompassed in the classification of a waterbody, that use shall be recognized.

(3) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected, except that a new or increased discharge of pollutants may be allowed, after intergovernmental coordination and public participation pursuant to applicable permitting and management processes, when the person proposing the new or increased discharge of pollutants demonstrates that the proposed discharge is necessary for important economic or social development. In such cases, water quality adequate to protect existing uses fully shall be maintained. All new and existing point source discharges shall be subject to the highest statutory and regulatory requirements, and nonpoint source discharges shall use best management practices adequate to protect water quality consistent with the Department's nonpoint source control program.

In short, this requires that water not be allowed to rise even to the verge of pollution – right up to the brink of exceeding criteria – but must rather be kept at cleaner levels where such exist in the absence of impacts. This is one of the reasons for our taking background, upstream, or reference samples at and near the Maxine site-- to determine what clean and polluted means in this case, rather than relying upon a published maximum allowable concentration that may be much higher in contaminant content. This is not just a good idea for water management; it is actually a required and equal component of the three parts of water quality standards.

Summary

It is my opinion that activities at the Maxine mine waste site, including continuous illegal discharges of pollutants, have and continue to violate the Clean Water Act and companion state law, and associated regulations. The filling and discharges have been done without required permits and are on-going.

Observations, testing, and sampling at and near the site confirm that conditions of severe pollution exist that will likely continue to exist and contribute contamination to downstream waters unless corrective action is taken. Current conditions violate various water quality criteria and do not protect for all legitimate uses of the waters, including public recreation in the river in and along the shore of the site.

Qualifications

My qualifications, education, and experience include degrees in Environmental Science (University of Virginia, 1975) and Environmental Engineering (Vanderbilt University, 1987), working for (what is now called) the Tennessee Department of Environment and Conservation (1976 - 1990), and for EPA (2005 – 2007), and twenty-five years of environmental consulting in private practice. Attachment 1 contains details of my qualifications, including publications, along with a listing of cases in which I have testified in the last four years and my fee schedule. All lab reports and associated documents are included in Attachments 3 and 4, and my field notes are in Attachment 2.



Report by: Barry Sulkin

Submitted: October 17, 2017

BARRY SULKIN
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PHONE (615) 255-2079 FAX (615) 251-0111

CURRICULUM VITA

Born: May 3, 1953, Memphis, TN

EDUCATION

1987 M.S., **Vanderbilt University** - Nashville, Tennessee
Major: Environmental Engineering

Master's Thesis: "HARPETH RIVER BELOW FRANKLIN DISSOLVED OXYGEN STUDY"- Field and lab study, QUAL2E computer modeling of river hydrology, water quality, and impacts of a sewage treatment plant.

1975 B.A., **University of Virginia** - Charlottesville, Virginia
Major: Environmental Science

Additional undergraduate courses: math and engineering at University of Tennessee - Knoxville 1982-1984

HONORS

Conservationist of the Year, 2011, Wild South's Roosevelt-Ash Society, Ashville, NC, March 23, 2012

River Hero Award, River Network 2006

Lifetime Achievement Award, Tennessee Environmental Council, 1990

Water Conservationist of the Year, Tennessee Conservation League, 1989

State of Tennessee/Vanderbilt University

Environmental Engineering Graduate School Scholarship, 1985 - 1987

duPont Scholarship, University of Virginia, 1971 - 1975

Eagle Scout, 1967

PROFESSIONAL EXPERIENCE - CURRENT

Sept. 1990 - **Environmental Consultant**

Present Self-employed

Investigator, consultant, and scientist serving clients such as attorneys, environmental/citizen organizations, cities, individuals, businesses, media, and sub-contractor for other consultants/engineers. Activities include research projects, field studies/sampling, site evaluations, stream/wetland determinations, permit negotiations, information and file research, photography, and expert witness presentations concerning water quality, TMDL, erosion, landfills, NEPA, FERC, NRC, and other environmental issues; also TN Director of Public Employees for Environmental Responsibility (PEER). Employed by EPA as special expert for Federal Advisory Committee for Detection and Quantitation and Uses in the Clean Water Act representing environmental groups (June 2005- Dec 2007).

PROFESSIONAL EXPERIENCE - PREVIOUS

1987-June 1990
and 1985 **Manager**
Enforcement and Compliance Section
Division of Water Pollution Control
Tennessee Dept. of Health and Environment
Nashville, Tennessee

Responsibilities: Statewide manager of enforcement investigations and legal referrals for water pollution programs under the federal Clean Water Act and the Tennessee Water Quality Act; witness for hearings before the Water Quality Control Board, and local and state courts; data processing and analysis for wastewater permit discharges; field research projects regarding water quality problems, as well as field work involving various stream, river, lake, and wetland issues.

1989 **Instructor**
Graduate School of Engineering
University of Tennessee, Knoxville (Nashville campus)

Responsibilities: Assistant instructor for graduate course in environmental engineering- wastewater treatment.

Sept.-Nov.1986
and 1981 **Assistant Manager**
Regional Field Office
Division of Water Pollution Control
Tennessee Dept. of Health and Environment
Nashville, Tennessee

Responsibilities: Coordinated inspections, complaint investigations, field studies, and enforcement for wastewater programs in 41 county region.

Sept. 1985
- Aug. 1986 Education leave to attend graduate school

1984-1985 **Special Projects Assistant**
Director's Office - Elmo Lunn, Director
Division of Water Pollution Control
Tennessee Dept. of Health and Environment
Nashville, Tennessee

Responsibilities: Provided statewide coordination and technical assistance on deep well waste injection regulations, clear- cutting forestry problem investigations, animal waste problems, public relations and media presentations, state planning and policy, enforcement and field office coordination.

1982-1984 **Enforcement Coordinator**

Regional Field Office
Division of Water Pollution Control
Tennessee Dept. of Health and Environment
Knoxville, Tennessee

Responsibilities: Coordinated enforcement action in municipal and industrial drinking water and wastewater programs in 24 county region, including fish kills, spills, complaint investigations, and stream studies.

1981-1982 **Assistant Manager**
Enforcement Section
Division of Water Pollution Control
Tennessee Dept. of Health and Environment
Nashville, Tennessee

Responsibilities: Coordinated statewide investigations and legal actions for drinking water, wastewater, and safe dam programs.

1977-1981 **Water Quality Specialist**
Regional Field Office
Division of Water Pollution Control
Tennessee Department of Health and Environment
Nashville, Tennessee

Responsibilities: Inspected drinking water, and municipal and industrial wastewater systems for 41 county area; investigated spills, underground storage tanks, fish kills, and citizen complaints; conducted stream studies; coordinated enforcement program.

1976-1977 **Water Quality Specialist**
Regional Field Office
Division of Water Pollution Control
Tennessee Dept. of Health and Environment
Chattanooga, Tennessee

Responsibilities: Inspected public drinking water systems for nine county area; investigated spills and citizen complaints.

1975 **Research Assistant/Lab Technician**
Department of Environmental Science
University of Virginia
Charlottesville, Virginia

Responsibilities: Analyzed soil and sediment from Chesapeake Bay and marsh/wetland sites for Corps of Engineers dredge spoils study.

1974 **Research Assistant**
Department of Environmental Science
University of Virginia
Charlottesville, Virginia

Responsibilities: Weather research project data processing.

1974 **Research Assistant/Lab Technician**
Department of Civil Engineering
Water Quality Lab
Memphis State University
Memphis, Tennessee

Responsibilities: Field sampling and lab analyses of water for study of urbanization impacts of watershed streams.

PROFESSIONAL/CIVIC ORGANIZATIONS & CERTIFICATIONS (Past & Present)

Community Engagement Committee, Nashville Planning Department, 2013 to present

Beaman Park to Bells Bend Conservation Corridor community organization,
Board of Directors, 2012 to present

Certified Erosion Prevention and Sedimentation Control Professional (TN), Aug. 2004

Davidson County Grand Jury, Oct. - Dec. 1998, Nashville, TN

Nashville and Davidson County - Floodplain Review Committee, Oct. - Dec. 1998

National Environmental Health Association
Registered Environmental Health Specialist, 1994

State of Tennessee - *Registered Professional Environmentalist*, 1982

American Society of Civil Engineers

Water Environment Federation

Tennessee Environmental Council, *Board of Directors & Advisory Board*, 1994 to present

International Erosion Control Association

Tennessee Scenic Rivers Association

American Water Resources Association

ADDITIONAL TRAINING

"Fundamentals of Erosion Prevention and Sediment Control" certification course by the University of Tennessee and the Tennessee Department of Environment and Conservation, August 26, 2004; Recertification October 9, 2007

ABASINS Training@ short course of EPA supported computer mapping and water quality modeling techniques, Utah State Univ., Logan UT, August 6 - 10, 2001

"Wetland Mitigation Techniques" workshop by Tennessee Tech. Univ., Cookeville, TN April 26, 1999

"Pulp and Paper Cluster Rule and Clean Water Act Permits", by Clean Water Network with EPA, Seattle, Washington, February 18-19, 1998

"Bioengineering Techniques for Streambank and Lakeshore Erosion Control", by Wendy Goldsmith, International Erosion Control Association, April 27, 1995

"Fundamentals of Hydrogeology, Karst Hydrogeology, and the Monitoring, Containment, and Treatment of Contaminated Ground Water", by Albert Ogden and Gerald Cox, January 6-7, 1994

"Ground Water Hydrogeology and Dye Tracing in Karst Terrains", by James Quinlan, April 2, 1992

"NPDES Permit Writers Course" by the Environmental Protection Agency (EPA), April 1988

"Sediment Oxygen Demand Workshop", by EPA, U.S. Environmental Research Laboratory, Gulf Breeze, Florida, September, 1987

"Compliance Monitoring for NPDES Permits", by EPA, October, 1978

"Hazardous Materials Tactical Workshop", by Tennessee Civil Defense, April 1978

"Troubleshooting O & M Problems at Municipal Wastewater Treatment Facilities", by EPA, March, 1978

PRESENTATIONS/PUBLICATIONS

November 2015

"Evidence For Leaking Of Two Coal Ash Storage Ponds To Local Surface Water And Groundwater In Tennessee", Harkness, Jennifer S.¹, Sulkin, Barry² and Vengosh, Avner¹, (¹Division of Earth and Ocean Sciences, Nicholas School of the Environment, Duke University, Durham, NC; ²Environmental Consultant, Nashville, TN); Abstract & Presentation at 2015 Geological Society of America Annual Meeting in Baltimore, MD

October 2010 & January 2015

Water Quality Sampling & Testing for Litigation Uses, Western Carolina University, Environmental Chemistry Class, Cullowhee, NC

April 2014 & March 2015

Environmental Regulatory Programs in State and Federal Government, Middle Tennessee State University, Murfreesboro, TN

June 2013

NPDES Permits & Cases Presentation at International WaterKeeper Alliance annual meeting, Calloway Gardens, Pine Mountain, GA

October 2012

Appalachian Public Interest Environmental Law Conference, University of Tennessee College of Law, “*Transportation Planning for the 21st Century*” panel, Knoxville, TN

March 2012

Alabama Rivers Alliance – “*How Winning Is Possible*” Keynote address for annual conference awards, Fairhope, AL

May 2001 – May 2013

River Rally, annual national training conference held in: California, North Carolina, Washington, Virginia, Colorado, New Hampshire, Ohio, Maryland, Utah, South Carolina, Oregon; taught various seminars each year on: Clean Water Act, NPDES Permits, Anti-degradation, Stormwater, TMDLs, Enforcement, Wetlands & Mitigation; conference by River Network based in Portland, OR

July 2005

“*The Clean Water Act Owner’s Manual*”, second edition, contributing writer & editor, River Network, Portland, OR

December 2003

“*Stream Flow and the Clean Water Act*”, Atlanta, GA, with River Network, Portland, OR

February 2003 & December 2004

“*Clean Water Act - Train the Trainer*”, Denver, CO & Madison, WI, with River Network, Portland, OR

May 2002

“*Tracking TMDLs*”, contributing writer & editor, National Wildlife Federation, Montpelier, VT & River Network, Portland, OR

February 2002

“*A Protocol for Establishing Sediment TMDLs*”, contributing writer & editor, developed for the Georgia Conservancy & University of Georgia Institute of Ecology by the Sediment TMDL Technical Advisory Group, Athens, GA

March 2001

“*The Ripple Effect - How to Make Waves in the Turbulent World of Watershed Cleanup Plans*”, contributing writer & editor, Clean Water Network, Washington, D.C.

October 1999 - April 2001

"Clean Water Act Workshop", presenter for three-day training conferences - Vermont, Georgia, Tennessee, Colorado, New Mexico, Ohio, and Alaska, with River Network, Portland, OR

October 2000

"TMDL Workshop", presenter for training in San Diego, CA, with River Network, Portland, OR

April 1999

"U.S. Environmental Laws & Regulations Compliance - Understanding Your Obligations Under the Clean Water Act", session on Clean Water Act for course sponsored by Government Institutes, Inc. of Rockville, MD, given in Nashville, TN

March 1999

"NPDES and State Water Quality Permits" and *"The TMDL Process"*, presentations at the Tenn. Clean Water Network conference; March 27, 1999, Bethany Hills Camp, Kingston Springs, TN

March 1999

"State of the Rivers: Tennessee" presentation at World Wildlife Fund *"State of the Rivers Conference"*, March 15, 1999, Chattanooga, TN, with co-author of Tenn. section of *"A Conservation Potential Assessment of the Mobile and Tennessee/Cumberland River Basins in Alabama, Georgia, and Tennessee"* by WWF

December 1998

"America's Animal Factories", contributing writer & editor, National Resources Defense Council, Washington, D.C.

December 1998

"The TMDL Process", presentation with NRDC attorney at national Sierra Club state leaders conference, Santa Fe, New Mexico, December 11, 1998

October 1998

"Clean Water Act Permits, Modeling, and TMDLs" presentation at national conference of clean water organizations & attorneys, by Clean Water Network/NRDC, Oct. 16, 1998, Washington, DC

May 1998

"Impacts of State Route 840 Upon the Human and Biophysical Environment" NEPA, ISTEA, and Public Participation in Transportation Projects, Dept. of Environmental Geography guest lecture, Austin Peay State University, May 1, 1998, Clarksville, TN

March 1998

"The State, EPA, Citizens - How the System Works" Tennessee Clean Water Conference, Opening Plenary Presentation, March 28, 1998, Nashville, TN

March 1998

"*Total Maximum Daily Loads (TMDL) The Science, Process, & Controversy*" American Water Resources Association 1988 Tennessee Conference; paper presentation as part of panel with EPA representatives on TMDLs, March 3, 1998, Nashville, TN.

February 1997

International Erosion Control Association, on panel of speakers for session on practical applications of erosion controls at annual IECA national conference, Nashville, TN

October 1994

"*Stream Ecology, BMPs, and Compliance*", environmental impacts of road building, Sierra Club Southern Appalachian Highlands Ecosystem Taskforce, Transportation Workshop, Banner Elk, NC

June 1994

"*Fundamentals of Tennessee Environmental Law*", presentation on Water Pollution Control and Compliance Strategies, for course sponsored by Government Institutes, Inc. of Rockville, MD, given in Knoxville, TN

June 1994

University of Tennessee Law School, guest lecture on water pollution and the related state and federal laws, Knoxville, TN

October 1992

"*Storm Water Regulations for Saw Mills*" - Seminar sponsored by the Tennessee Association of Forestry and the Univ. of TN, Nashville.

August 1992

"*Storm Water Regulations for Industry*" - Seminars sponsored by the Tennessee Association of Business and the Univ. of TN, Chattanooga, Knoxville, Jackson, and Nashville.

July 1992

Storm Water in Tennessee - A Training Manual for Manufacturers, University of Tennessee Center for Industrial Services

April 1992

"*Dissolved Oxygen Study - Sewage Treatment Impacts and Assessments*", VA Water Pollution Control Assoc. 46th Annual Conference, Roanoke, VA

October 1990

"*The Tainted Waters of the Cumberland*"; Cumberland Journal, v.1, no. 1, pp. 16-20; Nashville, Tennessee.

November 1988

"*A Rapid Bioassessment of Richland Creek, Davidson County*", by M. Browning, B. Sulkin, T. Merritt, TN Div. of Water Pollution Control

June 1988

"*Assimilative Capacity of the Obed River at Crossville, Tennessee*"; U.S. Geological Survey 1st Annual Hydrology Symposium, Nashville, TN

March 1987 - 1994

Vanderbilt University Graduate School of Engineering and Law School; guest lectures on water quality topics and computer modeling of river waste assimilative capacity.

July 1983

Testimony on the pollution at the Oak Ridge nuclear weapons facilities before Congressional hearing chaired by then Congressman Albert Gore.

BARRY SULKIN
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Nashville, TN 37218
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As of October 2017:

Testimony in past four years

Federal and state court and administrative cases in which I have given expert testimony in trial or deposition in the past four years are listed below:

2014

Barrow v City of Guyton, GA – expert testimony at state EPD administrative hearing, Atlanta

2015

PEER v TDOT – deposition in federal case re Hickman County wetland mitigation, Nashville

2017

Tennessee Clean Water Network et al v TVA – testimony in federal court re Gallatin power plant coal ash, Nashville

Upton et al v Plantation/Kinder Morgan – deposition re pipeline spill – Birmingham

Arrowhead Landfill, Uniontown, AL – deposition and testimony at state permit appeal

Marshall Power Plant, Duke Power, NC – deposition

ad HACH HQ 30d $C_{\text{cond}} = 1.083 \mu\text{S}/\text{cm} @ 70.8^\circ\text{F}$
 $\text{pH} = 6.43 @ 69.2^\circ\text{F}$
 $\rightarrow @ N 33.57121, W 87.15592$

③ WP = Sample 4 @ 12:05
Below outfall by River @ Spring
N 33.57118 W 87.15579
Cond = 3,400 $\mu\text{S}/\text{cm}$ 72.5°
pH = 3.48 @ 74.8°

led 08/15/18 Page 26 of 124
Make (cont) 8-177 page 2 of 2
up and to Rt flow to diversion channel
no into ravine

Back To Pond in Hollow to L (going up) $pH = 2.55$ 29.6°

⑦ Sample 5 @ 3:20
Back @ side - by pass stream/channel
by trucks @ N 33.57028 W 87.15577
Cond = 1177 $\mu\text{S}/\text{cm}$ 76.2°
pH = 3.5 @ 76.0°

Maxine AL 8/16/17 Day 1

D 1 of 4
wetter than
last visit① Sample site #2 @ 11:45
Only NO_2 , NO_3 + Cr6 - filter back@ Base sample
Cond 1,044 $\mu\text{S}/\text{cm}$ @ 71.1°F
pH 5.66 71.0② Sample @ Site 5 @ 12:15pm
Cond 1117 $\mu\text{S}/\text{cm}$ 76.9°F
pH 3.23 76.2°F
By Pass
channel
above crossing③ Sample @ Site 3 top of Spillway @ 12:40
Cond = 3,150 $\mu\text{S}/\text{cm}$ @ 93.4°F
pH = 2.71 @ 92.4°F④ Sample @ Site 4 bottom of Spillway @ 12:48
Cond = 3,310 $\mu\text{S}/\text{cm}$ @ 68.9°F
pH = 3.61 @ 70.3°F⑤ Sample @ Site 8 @ 2:15
up Rt side ravine - more water than
last time
Cond = 8,020 $\mu\text{S}/\text{cm}$ 80.6°F
pH = 2.88 87.2°F⑥ Sample @ Site 9 up Rt channel @ 2:30
Cond 8,220 83.8°F
pH 2.54 84.4°F

Maxine 8/16/17 Day 1 (cont) Page 2 of 4

⑦ Sample @ Site 10 @ 2:50pm
Cond = 48.8 $\mu\text{S}/\text{cm}$ @ 81.4°F
pH = 5.32 @ 81.0°F
Pond in
Headwatershike West to head wtrs of W Trib to
Trib 1 to Pond at Site 10
Forded where stream begins⑧ Sample site 6 @ 4:15 site 7
GPS N 33.5 T 320 W 87.16353
full suite of samples + Split w/ AMEC
w/ Nelson
Lester
SimonCond = 70.2 $\mu\text{S}/\text{cm}$ 73.9°F
pH = 5.40 72.9°F8/17/17
Day 2 To site by Boat ~ 11:00
w/ sampling only 1st① Sample @ site 3 top of Spillway
1 liter container @ each site
w/ Jock of
AMEC
@ 11:35am② Sample at site 4 bottom of Spillway
9 D/S spring @ Noon③ Sample @ Site 8 Rt side
further up
str above
2nd dam
@ 12:45④ back down toward upper dam side str
Sample @ 8 @ 1:25pm

Maxine 8-17-17 (cont)

Day-2

⑤ Sample River D/s site @ site (1)
Full set WET only @ 3:00 pm
@ N33.56902 W 87.15405

⑥ Sample River U/s @ Site (15)
WET Only @ 3:15 pm
@ N33.57346 W 87.15070
across from Camp Nod

8/18/17 (Day-3)

Hike up to spring + past power line
+ found it

① Sample site (11) @ 11:35 full set + split
GPS N33.57687 W 87.16523
Cond = 109.5 μ S/cm 74.4°F
pH = 5.35 74.5°F

W
Luke
Brackin
& Amec

Boat u/s to T-P camp

② Sample @ Site (13) @ 1:55 full set, split
N33.57950 W 87.15796
Cond = 4,970 μ S/cm 80.3°F
pH = 2.42 79.2

Back D/s Seep/Drainage (A)

N33.57871 W 87.15811°

D/s to Seep/Drainage (B)

N33.57764 W 87.15858

D/s " (C)

N33.57737 W 87.15867

D/s " (D)

N33.57660 W 87.15875

③ Back to (C) to Sample - full set + split
up at rock ledge spill over @ 3:10 pm
Cond 6,680 μ S/cm 79.1°F
pH 2.26 @ 78.9 Site (12)

@ N33.57752 W 87.15905

Back to R Nor U/s - across from "Camp Nod"

④ Sample site (15) @ 3:35 full set No Split
N33.57355 W 87.15080
Cond = 267 μ S/cm 88.6°F
pH = 9.14 88.9°F

⑤ Sample just D/s site @ Site (1) @ 3:50

N33.56912 W 87.15403

Cond = 264 μ S/cm 90.8°F
pH 9.17 89.3°F

Filter @
Camp

Rite in the Rain

Sutherland

Environmental Company, Inc.

2515 5th Avenue South
Birmingham, AL 35233
205-581-9500



Client:	Black Warrior Riverkeeper	Report Date:	September 21, 2016
Attention:	Mr. Nelson Brooke	Reference #	35795
Address:	712 37th St. South	P.O. #	verbal
	Birmingham, AL 35222	Project ID:	Maxine Mine

Sample Matrix:	water	Sample Collector:	B. Sulkin
Date Received:	9/21/16	Method Reference:	Standard Methods
Date /Time Collected:	9/20/16 @ 1045	Field ID:	SLO-1
		Lab ID:	176863

Parameter	Result	Units	Date / Time Assay	Analyst	Method	D.L.
pH	3.57	SU	9/21/16 1238	RC	SM4500-H+	na

Sample Matrix:	water	Sample Collector:	B. Sulkin
Date Received:	9/21/16	Method Reference:	Standard Methods
Date /Time Collected:	9/20/16 @ 1215	Field ID:	REF-1
		Lab ID:	176864

Parameter	Result	Units	Date / Time Assay	Analyst	Method	D.L.
pH	6.02	SU	9/21/16 1240	RC	SM4500-H+	na

Sample Matrix:	water	Sample Collector:	B. Sulkin
Date Received:	9/21/16	Method Reference:	Standard Methods
Date /Time Collected:	9/20/16 @ 1530	Field ID:	BCDS
		Lab ID:	176865

Parameter	Result	Units	Date / Time Assay	Analyst	Method	D.L.
pH	7.60	SU	9/21/16 1242	RC	SM4500-H+	na

N/A = Not Available

BDL = Below Detection Limit

DL = Detection Limit , Method

ND = Non Detect

MA / QAQC

EPA Laboratory ID AL01084

Respectfully submitted,

Kevin Doriety
Analytical Chemist

Sutherland

Environmental Company, Inc.

2515 5th Avenue South

BIRMINGHAM, AL. 35233

PHONE (205) 581-9500 FAX (205) 581-9504

E-Mail: suthlab@bellsouth.net

CHAIN OF CUSTODY ANALYSIS REQUEST

SEND REPORT TO:

Name: Melissa Brode

Invoice #

25795

Company: Black Water Riverkeeper

Address: 712 37th St

Burnham AL 352-22

Phone#: _____ Cell # _____

E-mail:

[illegible]

December 15, 2016

Nelson Brooke
Black Warrior River Keeper
712 37th Street South
Birmingham, AL 35222

RE: Project: Maxine Mine
Pace Project No.: 2042884

Dear Nelson Brooke:

Enclosed are the analytical results for sample(s) received by the laboratory on September 21, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Melissa MacNaughton
Melissa.MacNaughton@pacelabs.com
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Maxine Mine

Pace Project No.: 2042884

New Orleans Certification IDs

California Env. Lab Accreditation Program Branch:
11277CA

Florida Department of Health (NELAC): E87595

Illinois Environmental Protection Agency: 0025721

Kansas Department of Health and Environment (NELAC):
E-10266

Louisiana Dept. of Environmental Quality (NELAC/LELAP):
02006

Pennsylvania Dept. of Env Protection (NELAC): 68-04202

Texas Commission on Env. Quality (NELAC):
T104704405-09-TX

U.S. Dept. of Agriculture Foreign Soil Import: P330-10-
00119

Commonwealth of Virginia (TNI): 480246

Asheville Certification IDs

2225 Riverside Drive, Asheville, NC 28804

Florida/NELAP Certification #: E87648

Massachusetts Certification #: M-NC030

North Carolina Drinking Water Certification #: 37712

North Carolina Wastewater Certification #: 40

South Carolina Certification #: 99030001

Virginia/VELAP Certification #: 460222

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Maxine Mine

Pace Project No.: 2042884

Lab ID	Sample ID	Matrix	Date Collected	Date Received
2042884001	SLO1 WATER	Water	09/20/16 10:45	09/21/16 08:20
2042884002	REF1 WATER	Water	09/20/16 12:15	09/21/16 08:20
2042884003	BCDS WATER	Water	09/20/16 15:30	09/21/16 08:20
2042884004	SLO1 SED	Solid	09/20/16 10:45	09/21/16 08:20
2042884005	REF1 SED	Solid	09/20/16 12:15	09/21/16 08:20
2042884006	BCDS SED	Solid	09/20/16 15:30	09/21/16 08:20

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Maxine Mine
Pace Project No.: 2042884

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
2042884001	SLO1 WATER	EPA 6020	KJR	29	PASI-N
		EPA 7470	MHB1	1	PASI-N
		SM 2510B	TAE	1	PASI-N
		SM 2540C	CN	1	PASI-N
		SM 2540D	CN	1	PASI-N
		ASTM D4239-05	MJP	1	PASI-A
		Trivalent Chromium Calculation	TAE	1	PASI-N
		EPA 351.2	CN	1	PASI-N
		EPA 365.4	KEL	1	PASI-N
		SM 4500-CI-E	SMS2	1	PASI-N
		SM 4500-NH3 G	KEL	1	PASI-N
		SM 4500-NO3 F	KEL	1	PASI-N
		EPA 7196	SMS2	1	PASI-N
		EPA 9012	SMS2	1	PASI-N
		EPA 9065	TAE	1	PASI-N
		ASTM D516-90,02	SMS2	1	PASI-N
2042884002	REF1 WATER	EPA 6020	KJR	29	PASI-N
		EPA 7470	MHB1	1	PASI-N
		SM 2510B	TAE	1	PASI-N
		SM 2540C	CN	1	PASI-N
		SM 2540D	CN	1	PASI-N
		ASTM D4239-05	MJP	1	PASI-A
		Trivalent Chromium Calculation	TAE	1	PASI-N
		EPA 351.2	CN	1	PASI-N
		EPA 365.4	KEL	1	PASI-N
		SM 4500-CI-E	SMS2	1	PASI-N
		SM 4500-NH3 G	KEL	1	PASI-N
		SM 4500-NO3 F	KEL	1	PASI-N
		EPA 7196	SMS2	1	PASI-N
		EPA 9012	SMS2	1	PASI-N
		EPA 9065	TAE	1	PASI-N
		ASTM D516-90,02	SMS2	1	PASI-N
2042884003	BCDS WATER	EPA 6020	KJR	29	PASI-N
		EPA 7470	MHB1	1	PASI-N
		SM 2510B	TAE	1	PASI-N
		SM 2540C	CN	1	PASI-N
		SM 2540D	CN	1	PASI-N

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Maxine Mine
Pace Project No.: 2042884

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
2042884004	SLO1 SED	ASTM D4239-05	MJP	1	PASI-A
		Trivalent Chromium Calculation	TAE	1	PASI-N
		EPA 351.2	CN	1	PASI-N
		EPA 365.4	KEL	1	PASI-N
		SM 4500-CI-E	SMS2	1	PASI-N
		SM 4500-NH3 G	KEL	1	PASI-N
		SM 4500-NO3 F	KEL	1	PASI-N
		EPA 7196	SMS2	1	PASI-N
		EPA 9012	SMS2	1	PASI-N
		EPA 9065	TAE	1	PASI-N
		ASTM D516-90,02	SMS2	1	PASI-N
		EPA 6020	KJR	29	PASI-N
		EPA 7471	MHB1	1	PASI-N
		ASTM D4239-05	MJP	1	PASI-A
		EPA 351.2	CN	1	PASI-N
		EPA 365.4	KEL	1	PASI-N
		SM 4500-NH3 D	KEL	1	PASI-N
		SM 4500-NO3 F	CN	1	PASI-N
		EPA 7196	SMS2	1	PASI-N
		EPA 9012	SMS2	1	PASI-N
		EPA 9038	SMS2	1	PASI-N
		EPA 9065	SMS2	1	PASI-N
		EPA 9251	SMS2	1	PASI-N
2042884005	REF1 SED	EPA 6020	KJR	29	PASI-N
		EPA 7471	MHB1	1	PASI-N
		ASTM D4239-05	MJP	1	PASI-A
		EPA 351.2	CN	1	PASI-N
		EPA 365.4	KEL	1	PASI-N
		SM 4500-NH3 D	KEL	1	PASI-N
		SM 4500-NO3 F	CN	1	PASI-N
		EPA 7196	SMS2	1	PASI-N
		EPA 9012	SMS2	1	PASI-N
		EPA 9038	SMS2	1	PASI-N
		EPA 9065	SMS2	1	PASI-N
		EPA 9251	SMS2	1	PASI-N
2042884006	BCDS SED	EPA 6020	KJR	29	PASI-N
		EPA 7471	MHB1	1	PASI-N

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Maxine Mine

Pace Project No.: 2042884

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		ASTM D4239-05	MJP	1	PASI-A
		EPA 351.2	CN	1	PASI-N
		EPA 365.4	KEL	1	PASI-N
		SM 4500-NH3 D	KEL	1	PASI-N
		SM 4500-NO3 F	CN	1	PASI-N
		EPA 7196	SMS2	1	PASI-N
		EPA 9012	SMS2	1	PASI-N
		EPA 9065	SMS2	1	PASI-N
		EPA 9251	SMS2	1	PASI-N

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 6020

Description: 6020 MET ICPMS

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

6 samples were analyzed for EPA 6020. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3050 with any exceptions noted below.

The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Internal Standards:

All internal standards were within QC limits with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 63657

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 2042741023

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 264059)
 - Aluminum
 - Antimony
 - Arsenic
 - Barium
 - Calcium
 - Copper
 - Iron
 - Lead
 - Magnesium
 - Manganese
 - Molybdenum

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 6020

Description: 6020 MET ICPMS

Client: Black Warrior Riverkeeper

Date: December 15, 2016

QC Batch: 63657

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 2042741023

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- Selenium
- Silicon
- Titanium
- Vanadium
- MSD (Lab ID: 264060)
 - Aluminum
 - Antimony
 - Arsenic
 - Barium
 - Boron
 - Calcium
 - Copper
 - Iron
 - Lead
 - Manganese
 - Molybdenum
 - Nickel
 - Selenium
 - Silicon
 - Strontium
 - Titanium
 - Vanadium

R1: RPD value was outside control limits.

- MSD (Lab ID: 264060)
 - Antimony
 - Arsenic
 - Beryllium
 - Boron
 - Cadmium
 - Molybdenum
 - Nickel
 - Selenium
 - Silicon
 - Silver
 - Sodium
 - Thallium

QC Batch: 63893

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 2042935003,2043014005

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 265225)
 - Barium
 - Boron

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 6020

Description: 6020 MET ICPMS

Client: Black Warrior Riverkeeper

Date: December 15, 2016

QC Batch: 63893

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 2042935003,2043014005

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- Calcium
- Magnesium
- Manganese
- Sodium
- Strontium
- MS (Lab ID: 265227)
 - Boron
 - Calcium
 - Magnesium
 - Silicon
 - Sodium
 - Strontium
- MSD (Lab ID: 265226)
 - Barium
 - Calcium
 - Magnesium
 - Manganese
 - Sodium
 - Strontium
- MSD (Lab ID: 265228)
 - Calcium
 - Magnesium
 - Sodium
 - Strontium

Additional Comments:

Analyte Comments:

QC Batch: 63657

N2: The lab does not hold NELAC/TNI accreditation for this parameter.

- BCDS SED (Lab ID: 2042884006)
 - Silicon
- BLANK (Lab ID: 264057)
 - Silicon
- LCS (Lab ID: 264058)
 - Silicon
- MS (Lab ID: 264059)
 - Silicon
- MSD (Lab ID: 264060)
 - Silicon
- REF1 SED (Lab ID: 2042884005)
 - Silicon

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 6020

Description: 6020 MET ICPMS

Client: Black Warrior Riverkeeper

Date: December 15, 2016

Analyte Comments:

QC Batch: 63657

N2: The lab does not hold NELAC/TNI accreditation for this parameter.

- SLO1 SED (Lab ID: 2042884004)
- Silicon

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 7470

Description: 7470 Mercury

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for EPA 7470. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 7470 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 7471

Description: 7471 Mercury

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for EPA 7471. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 7471 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 63591

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 35264841002

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 263802)
 - Mercury
- MSD (Lab ID: 263803)
 - Mercury

R1: RPD value was outside control limits.

- MSD (Lab ID: 263803)
 - Mercury

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine
Pace Project No.: 2042884

Method: SM 2510B
Description: 2510B Specific Conductance
Client: Black Warrior Riverkeeper
Date: December 15, 2016

General Information:

3 samples were analyzed for SM 2510B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: SM 2540C

Description: 2540C Total Dissolved Solids

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for SM 2540C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: SM 2540D

Description: 2540D Total Suspended Solids

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for SM 2540D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: ASTM D4239-05

Description: ASTM D4239-05 Sulfur

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

6 samples were analyzed for ASTM D4239-05. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: 330128

N2: The lab does not hold NELAC/TNI accreditation for this parameter.

- BCDS SED (Lab ID: 2042884006)
 - Sulfur
- BCDS WATER (Lab ID: 2042884003)
 - Sulfur
- DUP (Lab ID: 1829356)
 - Sulfur
- REF1 SED (Lab ID: 2042884005)
 - Sulfur
- REF1 WATER (Lab ID: 2042884002)
 - Sulfur
- SLO1 SED (Lab ID: 2042884004)
 - Sulfur
- SLO1 WATER (Lab ID: 2042884001)
 - Sulfur

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: Trivalent Chromium Calculation

Description: Trivalent Chromium Calculation

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for Trivalent Chromium Calculation. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 351.2

Description: 351.2 Total Kjeldahl Nitrogen

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

6 samples were analyzed for EPA 351.2. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 351.2 with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 365.4

Description: 365.4 Total Phosphorus

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

6 samples were analyzed for EPA 365.4. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 365.4 with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: SM 4500-Cl-E

Description: 4500 Chloride

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for SM 4500-Cl-E. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: SM 4500-NH3 D

Description: 4500 Ammonia Soil, Distilled

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for SM 4500-NH3 D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with SM 4500-NH3 B with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

QC Batch: 64562

D6: The precision between the sample and sample duplicate exceeded laboratory control limits.

- DUP (Lab ID: 268217)
- Nitrogen, Ammonia

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: SM 4500-NH3 G

Description: 4500 Ammonia Water, Distilled

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for SM 4500-NH3 G. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with SM 4500-NH3 B with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 64605

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 2042888002

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 268350)
- Nitrogen, Ammonia

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: SM 4500-NO3 F

Description: SM4500NO3-F, NO3-NO2

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for SM 4500-NO3 F. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with SM 4500-NO3 F with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: SM 4500-NO3 F

Description: 4500NO3-F, NO3-NO2

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for SM 4500-NO3 F. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 7196

Description: Chromium, Hexavalent, soluble

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for EPA 7196. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 7196 with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 7196

Description: 7196 Chromium, Hexavalent

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for EPA 7196. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

H1: Analysis conducted outside the EPA method holding time.

- REF1 WATER (Lab ID: 2042884002)
- SLO1 WATER (Lab ID: 2042884001)

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 63584

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 2042884001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 263783)
- Chromium, Hexavalent

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine
Pace Project No.: 2042884

Method: EPA 9012
Description: 9012 Cyanide, Total
Client: Black Warrior Riverkeeper
Date: December 15, 2016

General Information:

6 samples were analyzed for EPA 9012. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 9010 with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 9038

Description: 9038 Sulfate, Turbidimetric

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

2 samples were analyzed for EPA 9038. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 9038 with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 9065

Description: 9065 Phenolics, Total

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

6 samples were analyzed for EPA 9065. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 9065 with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 63909

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 40138499001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 265285)
- Phenolics, Total Recoverable

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: EPA 9251

Description: 9251 Chloride

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for EPA 9251. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 9251 with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Maxine Mine

Pace Project No.: 2042884

Method: ASTM D516-90,02

Description: ASTM D516-9002 Sulfate Water

Client: Black Warrior Riverkeeper

Date: December 15, 2016

General Information:

3 samples were analyzed for ASTM D516-90,02. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Maxine Mine
Pace Project No.: 2042884

Sample: SLO1 WATER		Lab ID: 2042884001	Collected: 09/20/16 10:45	Received: 09/21/16 08:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS		Analytical Method: EPA 6020 Preparation Method: EPA 3010						
Aluminum	247	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:26	7429-90-5	
Antimony	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7440-36-0	
Arsenic	0.010	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7440-38-2	
Barium	0.0075	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7440-39-3	
Beryllium	0.067	mg/L	0.010	10	09/26/16 08:37	10/03/16 15:25	7440-41-7	
Boron	0.29	mg/L	0.0050	1	09/26/16 08:37	09/27/16 21:26	7440-42-8	
Cadmium	0.0013	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7440-43-9	
Calcium	281	mg/L	1.0	10	09/26/16 08:37	10/03/16 15:25	7440-70-2	
Chromium	0.015	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7440-47-3	
Cobalt	0.43	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7440-48-4	
Copper	ND	mg/L	0.0030	1	09/26/16 08:37	09/27/16 21:26	7440-50-8	
Iron	385	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:26	7439-89-6	
Lead	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7439-92-1	
Lithium	9.6	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7439-93-2	
Magnesium	326	mg/L	1.0	10	09/26/16 08:37	10/03/16 15:25	7439-95-4	
Manganese	17.8	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7439-96-5	
Molybdenum	ND	mg/L	0.0030	1	09/26/16 08:37	09/27/16 21:26	7439-98-7	
Nickel	0.81	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7440-02-0	
Potassium	3.8	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:26	7440-09-7	
Selenium	0.0040	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7782-49-2	
Silicon	35.3	mg/L	0.050	1	09/26/16 08:37	09/27/16 21:26	7440-21-3	
Silver	ND	mg/L	0.00050	1	09/26/16 08:37	09/27/16 21:26	7440-22-4	
Sodium	43.8	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:26	7440-23-5	
Strontium	0.072	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7440-24-6	
Thallium	0.00056	mg/L	0.00050	1	09/26/16 08:37	09/27/16 21:26	7440-28-0	
Tin	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7440-31-5	
Titanium	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:26	7440-32-6	
Vanadium	0.018	mg/L	0.0050	1	09/26/16 08:37	09/27/16 21:26	7440-62-2	
Zinc	1.5	mg/L	0.0050	1	09/26/16 08:37	09/27/16 21:26	7440-66-6	
7470 Mercury		Analytical Method: EPA 7470 Preparation Method: EPA 7470						
Mercury	ND	ug/L	0.20	1	09/22/16 10:45	09/22/16 14:37	7439-97-6	
2510B Specific Conductance		Analytical Method: SM 2510B						
Specific Conductance	5370	umhos/cm	1.0	1		09/23/16 15:20		
2540C Total Dissolved Solids		Analytical Method: SM 2540C						
Total Dissolved Solids	8710	mg/L	20.0	1		09/23/16 14:51		
2540D Total Suspended Solids		Analytical Method: SM 2540D						
Total Suspended Solids	27.0	mg/L	4.0	1		09/22/16 10:43		
ASTM D4239-05 Sulfur		Analytical Method: ASTM D4239-05						
Sulfur	0.136	% (w/w)	0.020	1		09/23/16 14:10		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Maxine Mine
Pace Project No.: 2042884

Sample: SLO1 WATER		Lab ID: 2042884001		Collected: 09/20/16 10:45		Received: 09/21/16 08:20		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
Trivalent Chromium Calculation		Analytical Method: Trivalent Chromium Calculation							
Chromium, Trivalent	ND	mg/L	0.010	1		10/04/16 00:00	16065-83-1		
351.2 Total Kjeldahl Nitrogen		Analytical Method: EPA 351.2 Preparation Method: EPA 351.2							
Nitrogen, Kjeldahl, Total	5.0	mg/L	0.10	1	09/28/16 15:39	09/30/16 11:19	7727-37-9		
365.4 Total Phosphorus		Analytical Method: EPA 365.4 Preparation Method: EPA 365.4							
Phosphorus	ND	mg/L	0.050	1	09/28/16 09:58	10/03/16 10:50	7723-14-0		
4500 Chloride		Analytical Method: SM 4500-Cl-E							
Chloride	1.5	mg/L	1.0	1		09/22/16 14:41	16887-00-6		
4500 Ammonia Water, Distilled		Analytical Method: SM 4500-NH3 G Preparation Method: SM 4500-NH3 B							
Nitrogen, Ammonia	4.1	mg/L	0.10	1	10/04/16 09:30	10/04/16 13:29	7664-41-7		
4500NO3-F, NO3-NO2		Analytical Method: SM 4500-NO3 F							
Nitrogen, NO2 plus NO3	0.099	mg/L	0.050	1		10/05/16 17:56			
7196 Chromium, Hexavalent		Analytical Method: EPA 7196							
Chromium, Hexavalent	ND	mg/L	0.010	1		09/21/16 15:59	18540-29-9	H1,M1	
9012 Cyanide, Total		Analytical Method: EPA 9012 Preparation Method: EPA 9010							
Cyanide	ND	mg/L	0.010	1	09/22/16 14:45	09/24/16 11:24	57-12-5		
9065 Phenolics, Total		Analytical Method: EPA 9065 Preparation Method: EPA 9065							
Phenolics, Total Recoverable	ND	mg/L	0.0060	1	09/23/16 10:30	09/23/16 14:45			
ASTM D516-9002 Sulfate Water		Analytical Method: ASTM D516-90,02							
Sulfate	6020	mg/L	500	500		09/22/16 16:48	14808-79-8	M6	

Sample: REF1 WATER		Lab ID: 2042884002	Collected: 09/20/16 12:15	Received: 09/21/16 08:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS		Analytical Method: EPA 6020 Preparation Method: EPA 3010						
Aluminum	ND	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:29	7429-90-5	
Antimony	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7440-36-0	
Arsenic	0.0015	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7440-38-2	
Barium	0.033	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7440-39-3	
Beryllium	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7440-41-7	
Boron	0.021	mg/L	0.0050	1	09/26/16 08:37	09/27/16 21:29	7440-42-8	
Cadmium	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7440-43-9	
Calcium	3.2	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:29	7440-70-2	
Chromium	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7440-47-3	
Cobalt	0.0011	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7440-48-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Maxine Mine
Pace Project No.: 2042884

Sample: REF1 WATER		Lab ID: 2042884002		Collected: 09/20/16 12:15		Received: 09/21/16 08:20		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
6020 MET ICPMS		Analytical Method: EPA 6020 Preparation Method: EPA 3010							
Copper	ND	mg/L	0.0030	1	09/26/16 08:37	09/27/16 21:29	7440-50-8		
Iron	3.8	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:29	7439-89-6		
Lead	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7439-92-1		
Lithium	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7439-93-2		
Magnesium	2.3	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:29	7439-95-4		
Manganese	0.63	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7439-96-5		
Molybdenum	ND	mg/L	0.0030	1	09/26/16 08:37	09/27/16 21:29	7439-98-7		
Nickel	0.0014	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7440-02-0		
Potassium	1.9	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:29	7440-09-7		
Selenium	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7782-49-2		
Silicon	1.0	mg/L	0.050	1	09/26/16 08:37	09/27/16 21:29	7440-21-3		
Silver	ND	mg/L	0.00050	1	09/26/16 08:37	09/27/16 21:29	7440-22-4		
Sodium	2.2	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:29	7440-23-5		
Strontium	0.022	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7440-24-6		
Thallium	ND	mg/L	0.00050	1	09/26/16 08:37	09/27/16 21:29	7440-28-0		
Tin	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7440-31-5		
Titanium	0.0015	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:29	7440-32-6		
Vanadium	ND	mg/L	0.0050	1	09/26/16 08:37	09/27/16 21:29	7440-62-2		
Zinc	ND	mg/L	0.0050	1	09/26/16 08:37	09/27/16 21:29	7440-66-6		
7470 Mercury		Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND	ug/L	0.20	1	09/22/16 10:45	09/22/16 14:43	7439-97-6		
2510B Specific Conductance		Analytical Method: SM 2510B							
Specific Conductance	95.0	umhos/cm	1.0	1		09/23/16 15:19			
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	15.0	mg/L	10.0	1		09/23/16 14:52			
2540D Total Suspended Solids		Analytical Method: SM 2540D							
Total Suspended Solids	22.0	mg/L	4.0	1		09/22/16 10:45			
ASTM D4239-05 Sulfur		Analytical Method: ASTM D4239-05							
Sulfur	ND	% (w/w)	0.020	1		09/23/16 14:10		N2	
Trivalent Chromium Calculation		Analytical Method: Trivalent Chromium Calculation							
Chromium, Trivalent	ND	mg/L	0.010	1		10/04/16 00:00	16065-83-1		
351.2 Total Kjeldahl Nitrogen		Analytical Method: EPA 351.2 Preparation Method: EPA 351.2							
Nitrogen, Kjeldahl, Total	1.4	mg/L	0.10	1	09/28/16 15:39	09/30/16 11:21	7727-37-9		
365.4 Total Phosphorus		Analytical Method: EPA 365.4 Preparation Method: EPA 365.4							
Phosphorus	0.091	mg/L	0.050	1	09/28/16 09:58	10/03/16 10:51	7723-14-0		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Maxine Mine
Pace Project No.: 2042884

Sample: REF1 WATER		Lab ID: 2042884002		Collected: 09/20/16 12:15		Received: 09/21/16 08:20		Matrix: Water	
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
4500 Chloride		Analytical Method: SM 4500-Cl-E							
Chloride	2.9	mg/L	1.0	1		09/22/16 14:41	16887-00-6		
4500 Ammonia Water, Distilled		Analytical Method: SM 4500-NH3 G Preparation Method: SM 4500-NH3 B							
Nitrogen, Ammonia	0.51	mg/L	0.10	1	10/04/16 09:30	10/04/16 13:30	7664-41-7		
4500NO3-F, NO3-NO2		Analytical Method: SM 4500-NO3 F							
Nitrogen, NO2 plus NO3	0.10	mg/L	0.050	1		10/05/16 17:57			
7196 Chromium, Hexavalent		Analytical Method: EPA 7196							
Chromium, Hexavalent	ND	mg/L	0.010	1		09/21/16 15:22	18540-29-9	H1	
9012 Cyanide, Total		Analytical Method: EPA 9012 Preparation Method: EPA 9010							
Cyanide	ND	mg/L	0.010	1	09/22/16 14:45	09/24/16 11:25	57-12-5		
9065 Phenolics, Total		Analytical Method: EPA 9065 Preparation Method: EPA 9065							
Phenolics, Total Recoverable	ND	mg/L	0.060	10	09/23/16 10:30	09/23/16 14:45			
ASTM D516-9002 Sulfate Water		Analytical Method: ASTM D516-90,02							
Sulfate	2.4	mg/L	1.0	1		09/22/16 14:44	14808-79-8		

Sample: BCDS WATER		Lab ID: 2042884003		Collected: 09/20/16 15:30		Received: 09/21/16 08:20		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
6020 MET ICPMS		Analytical Method: EPA 6020 Preparation Method: EPA 3010							
Aluminum	ND	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:33	7429-90-5		
Antimony	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7440-36-0		
Arsenic	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7440-38-2		
Barium	0.016	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7440-39-3		
Beryllium	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7440-41-7		
Boron	0.047	mg/L	0.0050	1	09/26/16 08:37	09/27/16 21:33	7440-42-8		
Cadmium	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7440-43-9		
Calcium	78.6	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:33	7440-70-2		
Chromium	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7440-47-3		
Cobalt	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7440-48-4		
Copper	ND	mg/L	0.0030	1	09/26/16 08:37	09/27/16 21:33	7440-50-8		
Iron	1.0	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:33	7439-89-6		
Lead	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7439-92-1		
Lithium	0.099	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7439-93-2		
Magnesium	27.6	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:33	7439-95-4		
Manganese	0.15	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7439-96-5		
Molybdenum	ND	mg/L	0.0030	1	09/26/16 08:37	09/27/16 21:33	7439-98-7		
Nickel	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7440-02-0		
Potassium	2.7	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:33	7440-09-7		
Selenium	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7782-49-2		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Maxine Mine
Pace Project No.: 2042884

Sample: BCDS WATER		Lab ID: 2042884003		Collected: 09/20/16 15:30		Received: 09/21/16 08:20		Matrix: Water	
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS		Analytical Method: EPA 6020 Preparation Method: EPA 3010							
Silicon	5.9	mg/L	0.050	1	09/26/16 08:37	09/27/16 21:33	7440-21-3		
Silver	ND	mg/L	0.00050	1	09/26/16 08:37	09/27/16 21:33	7440-22-4		
Sodium	148	mg/L	0.10	1	09/26/16 08:37	09/27/16 21:33	7440-23-5		
Strontium	1.1	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7440-24-6		
Thallium	ND	mg/L	0.00050	1	09/26/16 08:37	09/27/16 21:33	7440-28-0		
Tin	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7440-31-5		
Titanium	ND	mg/L	0.0010	1	09/26/16 08:37	09/27/16 21:33	7440-32-6		
Vanadium	ND	mg/L	0.0050	1	09/26/16 08:37	09/27/16 21:33	7440-62-2		
Zinc	ND	mg/L	0.0050	1	09/26/16 08:37	09/27/16 21:33	7440-66-6		
7470 Mercury		Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND	ug/L	0.20	1	09/22/16 10:45	09/22/16 14:45	7439-97-6		
2510B Specific Conductance		Analytical Method: SM 2510B							
Specific Conductance	1320	umhos/cm	1.0	1		09/23/16 15:19			
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	825	mg/L	10.0	1		09/23/16 14:52			
2540D Total Suspended Solids		Analytical Method: SM 2540D							
Total Suspended Solids	ND	mg/L	4.0	1		09/22/16 10:45			
ASTM D4239-05 Sulfur		Analytical Method: ASTM D4239-05							
Sulfur	ND	% (w/w)	0.020	1		09/23/16 14:10			N2
Trivalent Chromium Calculation		Analytical Method: Trivalent Chromium Calculation							
Chromium, Trivalent	ND	mg/L	0.010	1		10/04/16 00:00	16065-83-1		
351.2 Total Kjeldahl Nitrogen		Analytical Method: EPA 351.2 Preparation Method: EPA 351.2							
Nitrogen, Kjeldahl, Total	0.28	mg/L	0.10	1	09/28/16 15:39	09/30/16 11:21	7727-37-9		
365.4 Total Phosphorus		Analytical Method: EPA 365.4 Preparation Method: EPA 365.4							
Phosphorus	ND	mg/L	0.050	1	09/28/16 09:58	10/03/16 10:53	7723-14-0		
4500 Chloride		Analytical Method: SM 4500-Cl-E							
Chloride	4.5	mg/L	1.0	1		09/22/16 14:41	16887-00-6		
4500 Ammonia Water, Distilled		Analytical Method: SM 4500-NH3 G Preparation Method: SM 4500-NH3 B							
Nitrogen, Ammonia	0.24	mg/L	0.10	1	10/04/16 09:30	10/04/16 13:32	7664-41-7		
4500NO3-F, NO3-NO2		Analytical Method: SM 4500-NO3 F							
Nitrogen, NO2 plus NO3	0.36	mg/L	0.050	1		10/05/16 17:58			
7196 Chromium, Hexavalent		Analytical Method: EPA 7196							
Chromium, Hexavalent	ND	mg/L	0.010	1		09/21/16 15:22	18540-29-9		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Maxine Mine
Pace Project No.: 2042884

Sample: BCDS WATER		Lab ID: 2042884003		Collected: 09/20/16 15:30		Received: 09/21/16 08:20		Matrix: Water	
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
9012 Cyanide, Total		Analytical Method: EPA 9012 Preparation Method: EPA 9010							
Cyanide	ND	mg/L	0.010	1	09/22/16 14:45	09/24/16 11:25	57-12-5		
9065 Phenolics, Total		Analytical Method: EPA 9065 Preparation Method: EPA 9065							
Phenolics, Total Recoverable	ND	mg/L	0.060	10	09/23/16 10:30	09/23/16 14:46			
ASTM D516-9002 Sulfate Water		Analytical Method: ASTM D516-90,02							
Sulfate	436	mg/L	50.0	50		09/22/16 16:01	14808-79-8		

Sample: SLO1 SED		Lab ID: 2042884004		Collected: 09/20/16 10:45		Received: 09/21/16 08:20		Matrix: Solid	
Results reported on a "wet-weight" basis									
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS		Analytical Method: EPA 6020 Preparation Method: EPA 3050							
Aluminum	2780	mg/kg	26.6	1	09/22/16 10:16	09/27/16 09:57	7429-90-5		
Antimony	ND	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-36-0		
Arsenic	63.6	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-38-2		
Barium	109	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-39-3		
Beryllium	0.30	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-41-7		
Boron	3.2	mg/kg	1.3	1	09/22/16 10:16	09/27/16 09:57	7440-42-8		
Cadmium	ND	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-43-9		
Calcium	394	mg/kg	26.6	1	09/22/16 10:16	09/27/16 09:57	7440-70-2		
Chromium	6.4	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-47-3		
Cobalt	1.4	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-48-4		
Copper	13.4	mg/kg	1.3	1	09/22/16 10:16	09/27/16 09:57	7440-50-8		
Iron	33500	mg/kg	26.6	1	09/22/16 10:16	09/27/16 09:57	7439-89-6		
Lead	11.2	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7439-92-1		
Lithium	6.3	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7439-93-2		
Magnesium	510	mg/kg	26.6	1	09/22/16 10:16	09/27/16 09:57	7439-95-4		
Manganese	34.5	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7439-96-5		
Molybdenum	4.4	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7439-98-7		
Nickel	4.0	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-02-0		
Potassium	1070	mg/kg	26.6	1	09/22/16 10:16	09/27/16 09:57	7440-09-7		
Selenium	2.3	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7782-49-2		
Silicon	696	mg/kg	66.5	1	09/22/16 10:16	09/27/16 09:57	7440-21-3		N2
Silver	ND	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-22-4		
Sodium	460	mg/kg	26.6	1	09/22/16 10:16	09/27/16 09:57	7440-23-5		
Strontium	18.3	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-24-6		
Thallium	0.35	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-28-0		
Tin	ND	mg/kg	0.27	1	09/22/16 10:16	09/27/16 09:57	7440-31-5		
Titanium	23.7	mg/kg	1.3	1	09/22/16 10:16	09/27/16 09:57	7440-32-6		
Vanadium	16.1	mg/kg	1.3	1	09/22/16 10:16	09/27/16 09:57	7440-62-2		
Zinc	10.5	mg/kg	1.3	1	09/22/16 10:16	09/27/16 09:57	7440-66-6		

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ANALYTICAL RESULTS

Project: Maxine Mine
Pace Project No.: 2042884

Sample: SLO1 SED		Lab ID: 2042884004		Collected: 09/20/16 10:45		Received: 09/21/16 08:20		Matrix: Solid	
Results reported on a "wet-weight" basis									
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
7471 Mercury		Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	0.29	mg/kg	0.013	1	09/21/16 15:38	09/22/16 08:40	7439-97-6		
ASTM D4239-05 Sulfur		Analytical Method: ASTM D4239-05							
Sulfur	0.623	% (w/w)	0.020	1		09/23/16 14:10		N2	
351.2 Total Kjeldahl Nitrogen		Analytical Method: EPA 351.2 Preparation Method: EPA 351.2							
Nitrogen, Kjeldahl, Total	1530	mg/kg	297	6	09/28/16 15:39	09/29/16 19:22	7727-37-9		
365.4 Total Phosphorus		Analytical Method: EPA 365.4 Preparation Method: EPA 365.4							
Phosphorus	127	mg/kg	9.9	1	09/28/16 09:58	10/03/16 10:36	7723-14-0		
4500 Ammonia Soil, Distilled		Analytical Method: SM 4500-NH3 D Preparation Method: SM 4500-NH3 B							
Nitrogen, Ammonia	105	mg/kg	50.0	10	10/03/16 16:32	10/04/16 13:05	7664-41-7	D6	
SM4500NO3-F, NO3-NO2		Analytical Method: SM 4500-NO3 F Preparation Method: SM 4500-NO3 F							
Nitrogen, NO2 plus NO3	ND	mg/kg	0.48	1	09/24/16 11:27	09/25/16 18:06			
Chromium, Hexavalent, soluble		Analytical Method: EPA 7196 Preparation Method: EPA 7196							
Chromium, Hexavalent	ND	mg/kg	0.96	10	09/24/16 11:27	09/24/16 12:30	18540-29-9		
9012 Cyanide, Total		Analytical Method: EPA 9012 Preparation Method: EPA 9010							
Cyanide	ND	mg/kg	1.0	1	09/22/16 14:45	09/24/16 11:36	57-12-5		
9038 Sulfate, Turbidimetric		Analytical Method: EPA 9038 Preparation Method: EPA 9038							
Sulfate	3530	mg/kg	481	10	09/24/16 11:27	09/24/16 12:32	14808-79-8		
9065 Phenolics, Total		Analytical Method: EPA 9065 Preparation Method: EPA 9065							
Phenolics, Total Recoverable	1.6	mg/kg	0.15	1	09/26/16 09:12	09/27/16 14:28			
9251 Chloride		Analytical Method: EPA 9251 Preparation Method: EPA 9251							
Chloride	123	mg/kg	96.2	10	09/24/16 11:27	09/24/16 12:37	16887-00-6		

Sample: REF1 SED		Lab ID: 2042884005		Collected: 09/20/16 12:15		Received: 09/21/16 08:20		Matrix: Solid	
Results reported on a "wet-weight" basis									
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS		Analytical Method: EPA 6020 Preparation Method: EPA 3050							
Aluminum	3690	mg/kg	32.9	1	09/22/16 10:16	09/27/16 10:01	7429-90-5		
Antimony	ND	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-36-0		
Arsenic	1.8	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-38-2		
Barium	53.6	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-39-3		
Beryllium	ND	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-41-7		

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ANALYTICAL RESULTS

Project: Maxine Mine

Pace Project No.: 2042884

Sample: REF1 SED Lab ID: 2042884005 Collected: 09/20/16 12:15 Received: 09/21/16 08:20 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS Analytical Method: EPA 6020 Preparation Method: EPA 3050								
Boron	ND	mg/kg	1.6	1	09/22/16 10:16	09/27/16 10:01	7440-42-8	
Cadmium	ND	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-43-9	
Calcium	279	mg/kg	32.9	1	09/22/16 10:16	09/27/16 10:01	7440-70-2	
Chromium	4.2	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-47-3	
Cobalt	3.8	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-48-4	
Copper	5.0	mg/kg	1.6	1	09/22/16 10:16	09/27/16 10:01	7440-50-8	
Iron	6740	mg/kg	32.9	1	09/22/16 10:16	09/27/16 10:01	7439-89-6	
Lead	6.0	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7439-92-1	
Lithium	4.2	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7439-93-2	
Magnesium	328	mg/kg	32.9	1	09/22/16 10:16	09/27/16 10:01	7439-95-4	
Manganese	88.2	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7439-96-5	
Molybdenum	ND	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7439-98-7	
Nickel	5.6	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-02-0	
Potassium	307	mg/kg	32.9	1	09/22/16 10:16	09/27/16 10:01	7440-09-7	
Selenium	0.33	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7782-49-2	
Silicon	1040	mg/kg	82.2	1	09/22/16 10:16	09/27/16 10:01	7440-21-3	N2
Silver	ND	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-22-4	
Sodium	ND	mg/kg	32.9	1	09/22/16 10:16	09/27/16 10:01	7440-23-5	
Strontium	2.5	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-24-6	
Thallium	ND	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-28-0	
Tin	ND	mg/kg	0.33	1	09/22/16 10:16	09/27/16 10:01	7440-31-5	
Titanium	28.5	mg/kg	1.6	1	09/22/16 10:16	09/27/16 10:01	7440-32-6	
Vanadium	6.9	mg/kg	1.6	1	09/22/16 10:16	09/27/16 10:01	7440-62-2	
Zinc	18.4	mg/kg	1.6	1	09/22/16 10:16	09/27/16 10:01	7440-66-6	
7471 Mercury Analytical Method: EPA 7471 Preparation Method: EPA 7471								
Mercury	0.036	mg/kg	0.018	1	09/21/16 15:38	09/22/16 08:42	7439-97-6	
ASTM D4239-05 Sulfur Analytical Method: ASTM D4239-05								
Sulfur	0.0531	% (w/w)	0.020	1		09/23/16 14:10		N2
351.2 Total Kjeldahl Nitrogen Analytical Method: EPA 351.2 Preparation Method: EPA 351.2								
Nitrogen, Kjeldahl, Total	927	mg/kg	48.2	1	09/28/16 15:39	09/29/16 18:41	7727-37-9	
365.4 Total Phosphorus Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus	114	mg/kg	9.6	1	09/28/16 09:58	10/03/16 10:36	7723-14-0	
4500 Ammonia Soil, Distilled Analytical Method: SM 4500-NH3 D Preparation Method: SM 4500-NH3 B								
Nitrogen, Ammonia	78.0	mg/kg	50.0	10	10/03/16 16:32	10/04/16 13:09	7664-41-7	
SM4500NO3-F, NO3-NO2 Analytical Method: SM 4500-NO3 F Preparation Method: SM 4500-NO3 F								
Nitrogen, NO2 plus NO3	ND	mg/kg	0.40	1	09/24/16 11:27	09/25/16 18:09		
Chromium, Hexavalent, soluble Analytical Method: EPA 7196 Preparation Method: EPA 7196								
Chromium, Hexavalent	ND	mg/kg	0.81	10	09/24/16 11:27	09/24/16 12:30	18540-29-9	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Maxine Mine
Pace Project No.: 2042884

Sample: REF1 SED		Lab ID: 2042884005		Collected: 09/20/16 12:15		Received: 09/21/16 08:20		Matrix: Solid	
Results reported on a "wet-weight" basis									
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
9012 Cyanide, Total		Analytical Method: EPA 9012 Preparation Method: EPA 9010							
Cyanide	ND	mg/kg	1.0	1	09/22/16 14:45	09/24/16 11:24	57-12-5		
9038 Sulfate, Turbidimetric		Analytical Method: EPA 9038 Preparation Method: EPA 9038							
Sulfate	ND	mg/kg	403	10	09/24/16 11:27	09/24/16 12:32	14808-79-8		
9065 Phenolics, Total		Analytical Method: EPA 9065 Preparation Method: EPA 9065							
Phenolics, Total Recoverable	ND	mg/kg	0.15	1	09/26/16 09:12	09/27/16 14:35			
9251 Chloride		Analytical Method: EPA 9251 Preparation Method: EPA 9251							
Chloride	274	mg/kg	80.6	10	09/24/16 11:27	09/24/16 12:37	16887-00-6		

Sample: BCDS SED		Lab ID: 2042884006		Collected: 09/20/16 15:30		Received: 09/21/16 08:20		Matrix: Solid	
Results reported on a "wet-weight" basis									
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS		Analytical Method: EPA 6020 Preparation Method: EPA 3050							
Aluminum	868	mg/kg	18.7	1	09/22/16 10:16	09/27/16 10:05	7429-90-5		
Antimony	ND	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-36-0		
Arsenic	24.4	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-38-2		
Barium	39.1	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-39-3		
Beryllium	0.31	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-41-7		
Boron	1.4	mg/kg	0.93	1	09/22/16 10:16	09/27/16 10:05	7440-42-8		
Cadmium	ND	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-43-9		
Calcium	2710	mg/kg	18.7	1	09/22/16 10:16	09/27/16 10:05	7440-70-2		
Chromium	2.6	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-47-3		
Cobalt	4.4	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-48-4		
Copper	1.7	mg/kg	0.93	1	09/22/16 10:16	09/27/16 10:05	7440-50-8		
Iron	70300	mg/kg	18.7	1	09/22/16 10:16	09/27/16 10:05	7439-89-6		
Lead	1.7	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7439-92-1		
Lithium	2.3	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7439-93-2		
Magnesium	375	mg/kg	18.7	1	09/22/16 10:16	09/27/16 10:05	7439-95-4		
Manganese	1930	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7439-96-5		
Molybdenum	0.69	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7439-98-7		
Nickel	3.7	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-02-0		
Potassium	118	mg/kg	18.7	1	09/22/16 10:16	09/27/16 10:05	7440-09-7		B
Selenium	ND	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7782-49-2		
Silicon	3680	mg/kg	46.6	1	09/22/16 10:16	09/27/16 10:05	7440-21-3		N2
Silver	ND	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-22-4		
Sodium	169	mg/kg	18.7	1	09/22/16 10:16	09/27/16 10:05	7440-23-5		
Strontium	70.4	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-24-6		
Thallium	ND	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-28-0		
Tin	ND	mg/kg	0.19	1	09/22/16 10:16	09/27/16 10:05	7440-31-5		
Titanium	7.2	mg/kg	0.93	1	09/22/16 10:16	09/27/16 10:05	7440-32-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Maxine Mine

Pace Project No.: 2042884

Sample: BCDS SED		Lab ID: 2042884006		Collected: 09/20/16 15:30		Received: 09/21/16 08:20		Matrix: Solid	
Results reported on a "wet-weight" basis									
Parameters		Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS		Analytical Method: EPA 6020 Preparation Method: EPA 3050							
Vanadium	3.0	mg/kg	0.93	1	09/22/16 10:16	09/27/16 10:05	7440-62-2		
Zinc	5.9	mg/kg	0.93	1	09/22/16 10:16	09/27/16 10:05	7440-66-6		
7471 Mercury		Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	0.027	mg/kg	0.011	1	09/21/16 15:38	09/22/16 08:44	7439-97-6		
ASTM D4239-05 Sulfur		Analytical Method: ASTM D4239-05							
Sulfur	ND	% (w/w)	0.020	1		09/23/16 14:10			N2
351.2 Total Kjeldahl Nitrogen		Analytical Method: EPA 351.2 Preparation Method: EPA 351.2							
Nitrogen, Kjeldahl, Total	207	mg/kg	49.7	1	09/28/16 15:39	09/29/16 18:43	7727-37-9		
365.4 Total Phosphorus		Analytical Method: EPA 365.4 Preparation Method: EPA 365.4							
Phosphorus	73.1	mg/kg	9.9	1	09/28/16 09:58	10/03/16 10:37	7723-14-0		
4500 Ammonia Soil, Distilled		Analytical Method: SM 4500-NH3 D Preparation Method: SM 4500-NH3 B							
Nitrogen, Ammonia	239	mg/kg	50.0	10	10/03/16 16:32	10/04/16 13:11	7664-41-7		
SM4500NO3-F, NO3-NO2		Analytical Method: SM 4500-NO3 F Preparation Method: SM 4500-NO3 F							
Nitrogen, NO2 plus NO3	3.5	mg/kg	0.50	1	09/24/16 11:27	09/25/16 18:10			
Chromium, Hexavalent, soluble		Analytical Method: EPA 7196 Preparation Method: EPA 7196							
Chromium, Hexavalent	ND	mg/kg	1.0	10	09/24/16 11:27	09/24/16 12:30	18540-29-9		
9012 Cyanide, Total		Analytical Method: EPA 9012 Preparation Method: EPA 9010							
Cyanide	ND	mg/kg	1.0	1	09/22/16 14:45	09/24/16 11:24	57-12-5		
9065 Phenolics, Total		Analytical Method: EPA 9065 Preparation Method: EPA 9065							
Phenolics, Total Recoverable	0.52	mg/kg	0.15	1	09/26/16 09:12	09/27/16 14:35			
9251 Chloride		Analytical Method: EPA 9251 Preparation Method: EPA 9251							
Chloride	1480	mg/kg	100	10	09/24/16 11:27	09/24/16 12:37	16887-00-6		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63527 Analysis Method: EPA 7470
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury
Associated Lab Samples: 2042884001, 2042884002, 2042884003

METHOD BLANK: 263572 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	09/22/16 14:21	

LABORATORY CONTROL SAMPLE: 263573

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	1	1.0	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 263574 263575

Parameter	Units	2042749007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	1	1	0.97	0.97	96	96	75-125	0	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63591

Analysis Method: EPA 7471

QC Batch Method: EPA 7471

Analysis Description: 7471 Mercury

Associated Lab Samples: 2042884004, 2042884005, 2042884006

METHOD BLANK: 263800

Matrix: Solid

Associated Lab Samples: 2042884004, 2042884005, 2042884006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.020	09/22/16 08:07	

LABORATORY CONTROL SAMPLE: 263801

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	.1	0.11	106	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 263802

263803

Parameter	Units	35264841002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	0.37	.099	.08	0.36	0.49	-4	160	75-125	31	20	M1, R1

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QUALITY CONTROL DATA

Project: Maxine Mine
Pace Project No.: 2042884

QC Batch: 63657 Analysis Method: EPA 6020
QC Batch Method: EPA 3050 Analysis Description: 6020 MET
Associated Lab Samples: 2042884004, 2042884005, 2042884006

METHOD BLANK: 264057 Matrix: Solid
Associated Lab Samples: 2042884004, 2042884005, 2042884006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Aluminum	mg/kg	ND	50.0	09/27/16 09:50	
Antimony	mg/kg	ND	0.50	09/27/16 09:50	
Arsenic	mg/kg	ND	0.50	09/27/16 09:50	
Barium	mg/kg	ND	0.50	09/27/16 09:50	
Beryllium	mg/kg	ND	0.50	09/27/16 09:50	
Boron	mg/kg	ND	2.5	09/27/16 09:50	
Cadmium	mg/kg	ND	0.50	09/27/16 09:50	
Calcium	mg/kg	ND	50.0	09/27/16 09:50	
Chromium	mg/kg	ND	0.50	09/27/16 09:50	
Cobalt	mg/kg	ND	0.50	09/27/16 09:50	
Copper	mg/kg	ND	2.5	09/27/16 09:50	
Iron	mg/kg	ND	50.0	09/27/16 09:50	
Lead	mg/kg	ND	0.50	09/27/16 09:50	
Lithium	mg/kg	ND	0.50	09/27/16 09:50	
Magnesium	mg/kg	ND	50.0	09/27/16 09:50	
Manganese	mg/kg	ND	0.50	09/27/16 09:50	
Molybdenum	mg/kg	ND	0.50	09/27/16 09:50	
Nickel	mg/kg	ND	0.50	09/27/16 09:50	
Potassium	mg/kg	ND	50.0	09/27/16 09:50	B
Selenium	mg/kg	ND	0.50	09/27/16 09:50	
Silicon	mg/kg	ND	125	09/27/16 09:50	N2
Silver	mg/kg	ND	0.50	09/27/16 09:50	
Sodium	mg/kg	ND	50.0	09/27/16 09:50	
Strontium	mg/kg	ND	0.50	09/27/16 09:50	
Thallium	mg/kg	ND	0.50	09/27/16 09:50	
Tin	mg/kg	ND	0.50	09/27/16 09:50	
Titanium	mg/kg	ND	2.5	09/27/16 09:50	
Vanadium	mg/kg	ND	2.5	09/27/16 09:50	
Zinc	mg/kg	ND	2.5	09/27/16 09:50	

LABORATORY CONTROL SAMPLE: 264058

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Aluminum	mg/kg	1000	979	98	80-120	
Antimony	mg/kg	10	9.0	90	84-120	
Arsenic	mg/kg	10	9.1	91	84-120	
Barium	mg/kg	10	9.6	96	85-120	
Beryllium	mg/kg	10	9.1	91	80-120	
Boron	mg/kg	10	9.7	97	80-120	
Cadmium	mg/kg	10	9.3	93	85-120	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

LABORATORY CONTROL SAMPLE: 264058

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Calcium	mg/kg	1000	970	97	85-120	
Chromium	mg/kg	10	9.7	97	85-120	
Cobalt	mg/kg	10	9.7	97	85-120	
Copper	mg/kg	10	9.8	98	85-120	
Iron	mg/kg	1000	967	97	85-120	
Lead	mg/kg	10	9.5	95	83-120	
Lithium	mg/kg	10	9.6	96	80-120	
Magnesium	mg/kg	1000	966	97	80-120	
Manganese	mg/kg	10	9.8	98	85-120	
Molybdenum	mg/kg	10	9.6	96	85-120	
Nickel	mg/kg	10	9.8	98	85-120	
Potassium	mg/kg	1000	1030	103	85-119	
Selenium	mg/kg	10	9.2	92	84-120	
Silicon	mg/kg	500	461	92	80-120	N2
Silver	mg/kg	10	9.8	98	81-120	
Sodium	mg/kg	1000	986	99	85-120	
Strontium	mg/kg	10	9.6	96	85-120	
Thallium	mg/kg	10	9.8	98	83-120	
Tin	mg/kg	10	9.6	96	80-120	
Titanium	mg/kg	10	9.5	95	85-120	
Vanadium	mg/kg	10	9.6	96	81-120	
Zinc	mg/kg	10	9.4	94	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 264059 264060

Parameter	Units	2042741023 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Aluminum	mg/kg	14600	926	758	28400	25100	1490	1390	80-120	12	20	M1
Antimony	mg/kg	0.033	9.3	7.6	3.9	3.0	42	40	80-120	25	20	M1, R1
Arsenic	mg/kg	0.82	9.3	7.6	6.8	4.9	65	54	80-120	32	20	M1, R1
Barium	mg/kg	116	9.3	7.6	115	115	-9	-13	80-120	0	20	M1
Beryllium	mg/kg	0.27	9.3	7.6	9.0	7.1	94	90	80-120	23	20	R1
Boron	mg/kg	0.41	9.3	7.6	8.2	6.2	84	76	80-120	28	20	M1, R1
Cadmium	mg/kg	0.0060	9.3	7.6	8.2	6.5	89	86	80-120	23	20	R1
Calcium	mg/kg	1890	926	758	2630	2270	79	50	80-120	14	20	M1
Chromium	mg/kg	3.8	9.3	7.6	11.5	10.1	83	83	80-120	13	20	
Cobalt	mg/kg	5.3	9.3	7.6	13.2	11.4	85	80	80-120	15	20	
Copper	mg/kg	22.0	9.3	7.6	28.4	27.0	70	66	80-120	5	20	M1
Iron	mg/kg	22700	926	758	27700	24900	541	295	75-125	11	20	M1
Lead	mg/kg	4.3	9.3	7.6	15.9	13.8	125	126	80-120	14	20	M1
Lithium	mg/kg	2.1	9.3	7.6	13.0	11.3	118	122	75-125	14	20	
Magnesium	mg/kg	1580	926	758	2790	2370	130	105	80-120	16	20	M1
Manganese	mg/kg	347	9.3	7.6	348	337	10	-131	75-125	3	20	M1
Molybdenum	mg/kg	0.022	9.3	7.6	5.6	4.2	61	55	80-120	30	20	M1, R1
Nickel	mg/kg	3.2	9.3	7.6	10.9	8.8	83	74	80-120	21	20	M1, R1

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:												
264059				264060								
Parameter	Units	2042741023	MS	MSD	MS	MSD	MS	MSD	% Rec	Max		
		Result	Spike	Spike						Result	Result	% Rec
Potassium	mg/kg	245	926	758	1150	959	98	94	80-120	18	20	
Selenium	mg/kg	0.29	9.3	7.6	6.5	4.6	67	57	80-120	33	20	M1, R1
Silicon	mg/kg	2250	463	379	1590	1050	-142	-315	75-125	41	20	M1, N2, R1
Silver	mg/kg	0.0065	9.3	7.6	8.2	6.2	88	82	80-120	27	20	R1
Sodium	mg/kg	113	926	758	915	725	87	81	80-120	23	20	R1
Strontium	mg/kg	49.7	9.3	7.6	57.9	49.2	88	-7	75-125	16	20	M1
Thallium	mg/kg	0.042	9.3	7.6	9.5	7.6	102	100	80-120	22	20	R1
Tin	mg/kg	0.43	9.3	7.6	9.4	8.7	97	109	80-120	8	20	
Titanium	mg/kg	118	9.3	7.6	186	173	737	729	75-125	7	20	M1
Vanadium	mg/kg	55.8	9.3	7.6	67.2	68.9	123	173	80-120	3	20	M1
Zinc	mg/kg	14.9	9.3	7.6	25.1	22.2	109	96	80-120	12	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63893 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 2042884001, 2042884002, 2042884003

METHOD BLANK: 265223 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Aluminum	mg/L	ND	0.10	09/27/16 18:08	
Antimony	mg/L	ND	0.0010	09/27/16 18:08	
Arsenic	mg/L	ND	0.0010	09/27/16 18:08	
Barium	mg/L	ND	0.0010	09/27/16 18:08	
Beryllium	mg/L	ND	0.0010	09/27/16 18:08	
Boron	mg/L	ND	0.0050	09/27/16 18:08	
Cadmium	mg/L	ND	0.0010	09/27/16 18:08	
Calcium	mg/L	ND	0.10	09/27/16 18:08	
Chromium	mg/L	ND	0.0010	09/27/16 18:08	
Cobalt	mg/L	ND	0.0010	09/27/16 18:08	
Copper	mg/L	ND	0.0030	09/27/16 18:08	
Iron	mg/L	ND	0.10	09/27/16 18:08	
Lead	mg/L	ND	0.0010	09/27/16 18:08	
Lithium	mg/L	ND	0.0010	09/27/16 18:08	
Magnesium	mg/L	ND	0.10	09/27/16 18:08	
Manganese	mg/L	ND	0.0010	09/27/16 18:08	
Molybdenum	mg/L	ND	0.0030	09/27/16 18:08	
Nickel	mg/L	ND	0.0010	09/27/16 18:08	
Potassium	mg/L	ND	0.10	09/27/16 18:08	
Selenium	mg/L	ND	0.0010	09/27/16 18:08	
Silicon	mg/L	ND	0.050	09/27/16 18:08	
Silver	mg/L	ND	0.00050	09/27/16 18:08	
Sodium	mg/L	ND	0.10	09/27/16 18:08	
Strontium	mg/L	ND	0.0010	09/27/16 18:08	
Thallium	mg/L	ND	0.00050	09/27/16 18:08	
Tin	mg/L	ND	0.0010	09/27/16 18:08	
Titanium	mg/L	ND	0.0010	09/27/16 18:08	
Vanadium	mg/L	ND	0.0050	09/27/16 18:08	
Zinc	mg/L	ND	0.0050	09/27/16 18:08	

LABORATORY CONTROL SAMPLE: 265224

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Aluminum	mg/L	2	2.0	101	80-117	
Antimony	mg/L	.02	0.020	99	85-115	
Arsenic	mg/L	.02	0.020	101	83-115	
Barium	mg/L	.02	0.020	101	85-115	
Beryllium	mg/L	.02	0.020	100	80-116	
Boron	mg/L	.02	0.020	102	80-120	
Cadmium	mg/L	.02	0.020	100	85-115	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

LABORATORY CONTROL SAMPLE: 265224

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Calcium	mg/L	2	2.0	102	80-120	
Chromium	mg/L	.02	0.020	100	85-115	
Cobalt	mg/L	.02	0.020	101	85-115	
Copper	mg/L	.02	0.021	104	80-120	
Iron	mg/L	2	2.0	100	80-120	
Lead	mg/L	.02	0.019	96	84-115	
Lithium	mg/L	.02	0.020	98	80-120	
Magnesium	mg/L	2	2.0	99	80-120	
Manganese	mg/L	.02	0.020	102	85-115	
Molybdenum	mg/L	.02	0.019	97	81-115	
Nickel	mg/L	.02	0.020	101	80-118	
Potassium	mg/L	2	2.1	105	80-120	
Selenium	mg/L	.02	0.021	105	85-115	
Silicon	mg/L	1	1.0	100	80-120	
Silver	mg/L	.02	0.020	101	80-115	
Sodium	mg/L	2	2.0	101	80-120	
Strontium	mg/L	.02	0.020	100	80-120	
Thallium	mg/L	.02	0.019	95	82-115	
Tin	mg/L	.02	0.020	99	81-115	
Titanium	mg/L	.02	0.020	98	80-120	
Vanadium	mg/L	.02	0.020	100	81-115	
Zinc	mg/L	.02	0.021	105	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 265225 265226

Parameter	Units	2042935003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Aluminum	mg/L		2	2	2.1	2.1	101	101	80-120	0	20	
Antimony	mg/L		.02	.02	0.020	0.020	98	101	80-120	3	20	
Arsenic	mg/L		.02	.02	0.023	0.024	93	93	80-120	1	20	
Barium	mg/L		.02	.02	0.60	0.61	22	56	80-120	1	20 M1	
Beryllium	mg/L		.02	.02	0.021	0.021	105	106	80-120	2	20	
Boron	mg/L		.02	.02	0.46	0.47	59	84	75-125	1	20 M1	
Cadmium	mg/L		.02	.02	0.018	0.019	92	93	80-120	2	20	
Calcium	mg/L		2	2	127	128	-15	15	80-120	0	20 M1	
Chromium	mg/L		.02	.02	0.019	0.019	91	92	80-120	2	20	
Cobalt	mg/L		.02	.02	0.019	0.019	88	89	80-120	0	20	
Copper	mg/L		.02	.02	0.017	0.017	82	83	80-120	0	20	
Iron	mg/L		2	2	2.6	2.6	92	93	80-120	1	20	
Lead	mg/L		.02	.02	0.020	0.021	101	103	80-120	2	20	
Lithium	mg/L		.02	.02	0.050	0.051	99	102	80-120	1	20	
Magnesium	mg/L		2	2	48.8	48.7	65	63	80-120	0	20 M1	
Manganese	mg/L		.02	.02	0.96	0.96	37	50	80-120	0	20 M1	
Molybdenum	mg/L		.02	.02	0.020	0.021	94	97	80-120	3	20	
Nickel	mg/L		.02	.02	0.019	0.019	84	86	80-120	1	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 265225				265226								
Parameter	Units	2042935003	MS	MSD	MS	MSD	MS	MSD	% Rec	Max	Qual	
		Result	Spike Conc.	Spike Conc.								Result
Potassium	mg/L		2	2	4.7	4.7	90	90	75-125	0	20	
Selenium	mg/L	ND	.02	.02	0.019	0.019	93	94	80-120	1	20	
Silicon	mg/L		1	1	13.3	13.3	77	77	75-125	0	20	
Silver	mg/L		.02	.02	0.017	0.017	84	85	80-120	1	20	
Sodium	mg/L		2	2	123	123	5	5	75-125	0	20 M1	
Strontium	mg/L		.02	.02	1.4	1.4	-20	45	75-125	1	20 M1	
Thallium	mg/L		.02	.02	0.020	0.020	99	102	80-120	3	20	
Tin	mg/L		.02	.02	0.020	0.020	97	99	80-120	2	20	
Titanium	mg/L		.02	.02	0.021	0.021	101	101	80-120	0	20	
Vanadium	mg/L		.02	.02	0.020	0.020	95	96	80-120	1	20	
Zinc	mg/L		.02	.02	0.022	0.022	88	89	80-120	1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 265227				265228								
		2043014005	MS	MSD								
Parameter	Units	Result	Spike Conc.	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Aluminum	mg/L				2.2	2.1				1	20	
Antimony	mg/L				0.020	0.021				2	20	
Arsenic	mg/L				0.021	0.021				0	20	
Barium	mg/L				0.082	0.084				2	20	
Beryllium	mg/L				0.022	0.022				0	20	
Boron	mg/L				0.21	0.22				2	20	M1
Cadmium	mg/L				0.019	0.019				1	20	
Calcium	mg/L				90.8	93.7				3	20	M1
Chromium	mg/L				0.019	0.019				0	20	
Cobalt	mg/L				0.018	0.018				1	20	
Copper	mg/L				0.018	0.017				1	20	
Iron	mg/L				1.9	1.9				1	20	
Lead	mg/L				0.021	0.021				0	20	
Lithium	mg/L				0.060	0.061				2	20	
Magnesium	mg/L				43.3	44.6				3	20	M1
Manganese	mg/L				0.18	0.18				3	20	
Molybdenum	mg/L				0.025	0.025				1	20	
Nickel	mg/L				0.018	0.019				1	20	
Potassium	mg/L				5.2	5.4				3	20	
Selenium	mg/L				0.021	0.022				3	20	
Silicon	mg/L				12.7	13.1				3	20	M1
Silver	mg/L				0.018	0.018				1	20	
Sodium	mg/L				67.9	70.2				3	20	M1
Strontium	mg/L				1.4	1.4				1	20	M1
Thallium	mg/L				0.020	0.020				0	20	
Tin	mg/L				0.020	0.021				1	20	
Titanium	mg/L				0.018	0.021				11	20	
Vanadium	mg/L				0.039	0.040				1	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 265227 265228												
Parameter	Units	2043014005	MS	MSD	MS	MSD	MS	MSD	% Rec	Max	RPD	Qual
		Result	Spike Conc.	Spike Conc.								
Zinc	mg/L				0.020	0.020					1	20

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch:	63819	Analysis Method:	SM 2510B
QC Batch Method:	SM 2510B	Analysis Description:	2510B Specific Conductance
Associated Lab Samples:	2042884001, 2042884002, 2042884003		

METHOD BLANK: 264758 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Specific Conductance	umhos/cm	ND	1.0	09/23/16 15:12	

LABORATORY CONTROL SAMPLE: 264759

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Specific Conductance	umhos/cm	1410	1450	103	95-105	

SAMPLE DUPLICATE: 264760

Parameter	Units	2042596001 Result	Dup Result	RPD	Max RPD	Qualifiers
Specific Conductance	umhos/cm	681	684	0	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch:	63802	Analysis Method:	SM 2540C
QC Batch Method:	SM 2540C	Analysis Description:	2540C Total Dissolved Solids
Associated Lab Samples:	2042884001, 2042884002, 2042884003		

METHOD BLANK: 264678 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	10.0	09/23/16 14:50	

LABORATORY CONTROL SAMPLE: 264679

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	100	84.0	84	80-120	

SAMPLE DUPLICATE: 264680

Parameter	Units	2043007001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	4030	4320	7	20	

SAMPLE DUPLICATE: 264681

Parameter	Units	2042917007 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	4160	4240	2	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63666 Analysis Method: SM 2540D
QC Batch Method: SM 2540D Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 2042884001, 2042884002, 2042884003

METHOD BLANK: 264095 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	4.0	09/22/16 10:41	

LABORATORY CONTROL SAMPLE: 264096

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solids	mg/L	100	91.0	91	80-120	

SAMPLE DUPLICATE: 264097

Parameter	Units	2042892001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	14.0	15.0	7	20	

SAMPLE DUPLICATE: 264098

Parameter	Units	2042908001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	ND	ND		20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 330128

Analysis Method: ASTM D4239-05

QC Batch Method: ASTM D4239-05

Analysis Description: ASTM D4239-05 Sulfur

Associated Lab Samples: 2042884001, 2042884002, 2042884003, 2042884004, 2042884005, 2042884006

SAMPLE DUPLICATE: 1829356

Parameter	Units	92313269001 Result	Dup Result	RPD	Max RPD	Qualifiers
Sulfur	% (w/w)	0.117	0.120	3	10	N2

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 64169 Analysis Method: EPA 351.2
QC Batch Method: EPA 351.2 Analysis Description: 351.2 TKN
Associated Lab Samples: 2042884004, 2042884005, 2042884006

METHOD BLANK: 266349 Matrix: Solid

Associated Lab Samples: 2042884004, 2042884005, 2042884006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	ND	50.0	09/30/16 10:55	

LABORATORY CONTROL SAMPLE: 266350

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	525	500	95	80-120	

MATRIX SPIKE SAMPLE: 266452

Parameter	Units	2042884006 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	207	241	428	92	75-125	

SAMPLE DUPLICATE: 266451

Parameter	Units	2042884006 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	207	195	6	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 64174 Analysis Method: EPA 351.2
QC Batch Method: EPA 351.2 Analysis Description: 351.2 TKN
Associated Lab Samples: 2042884001, 2042884002, 2042884003

METHOD BLANK: 266361 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	ND	0.10	09/30/16 10:57	

LABORATORY CONTROL SAMPLE: 266362

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	5.2	5.2	99	80-120	

MATRIX SPIKE SAMPLE: 266364

Parameter	Units	2042881001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	1.1	2.5	4.0	117	75-125	

SAMPLE DUPLICATE: 266363

Parameter	Units	2042881001 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	1.1	0.92	18	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 64170 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Total Phosphorus
Associated Lab Samples: 2042884004, 2042884005, 2042884006

METHOD BLANK: 266353 Matrix: Solid

Associated Lab Samples: 2042884004, 2042884005, 2042884006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/kg	ND	10.0	10/03/16 10:35	

LABORATORY CONTROL SAMPLE: 266354

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/kg	203	211	104	80-120	

MATRIX SPIKE SAMPLE: 266454

Parameter	Units	2042884006 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/kg	73.1	241	291	91	75-125	

SAMPLE DUPLICATE: 266453

Parameter	Units	2042884006 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus	mg/kg	73.1	72.0	2	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 64171

Analysis Method: EPA 365.4

QC Batch Method: EPA 365.4

Analysis Description: 365.4 Phosphorus

Associated Lab Samples: 2042884001, 2042884002, 2042884003

METHOD BLANK: 266357

Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/L	ND	0.050	10/03/16 10:40	

LABORATORY CONTROL SAMPLE: 266358

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	2	2.1	102	80-120	

MATRIX SPIKE SAMPLE: 266360

Parameter	Units	2042881001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.20	2.5	2.7	99	75-125	

SAMPLE DUPLICATE: 266359

Parameter	Units	2042881001 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus	mg/L	0.20	0.21	7	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63698 Analysis Method: SM 4500-Cl-E
QC Batch Method: SM 4500-Cl-E Analysis Description: 4500 Chloride
Associated Lab Samples: 2042884001, 2042884002, 2042884003

METHOD BLANK: 264180 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	09/22/16 11:12	

LABORATORY CONTROL SAMPLE: 264181

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	107	105	98	90-110	

MATRIX SPIKE SAMPLE: 264183

Parameter	Units	2042884001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	1.5	100	102	101	75-125	

SAMPLE DUPLICATE: 264182

Parameter	Units	2042884001 Result	Dup Result	RPD	Max RPD	Qualifiers
Chloride	mg/L	1.5	1.5	2	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 64562 Analysis Method: SM 4500-NH3 D
QC Batch Method: SM 4500-NH3 B Analysis Description: 4500 Ammonia, Distilled
Associated Lab Samples: 2042884004, 2042884005, 2042884006

METHOD BLANK: 268215 Matrix: Solid

Associated Lab Samples: 2042884004, 2042884005, 2042884006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/kg	ND	5.0	10/04/16 13:04	

LABORATORY CONTROL SAMPLE: 268216

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/kg	50	46.9	94	80-120	

MATRIX SPIKE SAMPLE: 268218

Parameter	Units	2042884004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/kg	105	50	157	105	75-125	

SAMPLE DUPLICATE: 268217

Parameter	Units	2042884004 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Ammonia	mg/kg	105	78.4	29	20	D6

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 64605 Analysis Method: SM 4500-NH3 G
QC Batch Method: SM 4500-NH3 B Analysis Description: 4500 Ammonia, Distilled
Associated Lab Samples: 2042884001, 2042884002, 2042884003

METHOD BLANK: 268347 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/L	ND	0.10	10/04/16 13:25	

LABORATORY CONTROL SAMPLE: 268348

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	1	0.94	94	80-120	

MATRIX SPIKE SAMPLE: 268350

Parameter	Units	2042888002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	0.89	1	1.3	41	75-125	M1

SAMPLE DUPLICATE: 268349

Parameter	Units	2042888002 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Ammonia	mg/L	0.89	0.89	1	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63792

Analysis Method: SM 4500-NO3 F

QC Batch Method: SM 4500-NO3 F

Analysis Description: SM4500NO3-F, Nitrate

Associated Lab Samples: 2042884004, 2042884005, 2042884006

METHOD BLANK: 264636

Matrix: Solid

Associated Lab Samples: 2042884004, 2042884005, 2042884006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, NO2 plus NO3	mg/kg	ND	0.50	09/25/16 18:02	

LABORATORY CONTROL SAMPLE: 264637

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, NO2 plus NO3	mg/kg	17.7	19.5	110	80-120	

MATRIX SPIKE SAMPLE: 264639

Parameter	Units	2042884004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, NO2 plus NO3	mg/kg	ND	9.4	10.8	114	80-120	

SAMPLE DUPLICATE: 264638

Parameter	Units	2042884004 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, NO2 plus NO3	mg/kg	ND	ND		20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch:	64820	Analysis Method:	SM 4500-NO3 F
QC Batch Method:	SM 4500-NO3 F	Analysis Description:	SM4500NO3-F, Nitrate, Preserved
Associated Lab Samples:	2042884001, 2042884002, 2042884003		

METHOD BLANK: 269032 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, NO2 plus NO3	mg/L	ND	0.050	10/05/16 17:48	

LABORATORY CONTROL SAMPLE: 269033

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, NO2 plus NO3	mg/L	1.8	1.6	91	90-110	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63793

Analysis Method: EPA 7196

QC Batch Method: EPA 7196

Analysis Description: 7196 Chromium, Hexavalent

Associated Lab Samples: 2042884004, 2042884005, 2042884006

METHOD BLANK: 264640

Matrix: Solid

Associated Lab Samples: 2042884004, 2042884005, 2042884006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chromium, Hexavalent	mg/kg	ND	0.10	09/24/16 12:30	

LABORATORY CONTROL SAMPLE: 264641

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent	mg/kg	2	2.0	98	80-120	

MATRIX SPIKE SAMPLE: 264643

Parameter	Units	2042884004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent	mg/kg	ND	23.6	20.9	89	75-125	

SAMPLE DUPLICATE: 264642

Parameter	Units	2042884004 Result	Dup Result	RPD	Max RPD	Qualifiers
Chromium, Hexavalent	mg/kg	ND	ND		20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63584 Analysis Method: EPA 7196
QC Batch Method: EPA 7196 Analysis Description: 7196 Chromium, Hexavalent
Associated Lab Samples: 2042884001, 2042884002, 2042884003

METHOD BLANK: 263780 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chromium, Hexavalent	mg/L	ND	0.010	09/21/16 15:58	

LABORATORY CONTROL SAMPLE: 263781

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent	mg/L	.2	0.20	102	90-110	

MATRIX SPIKE SAMPLE: 263783

Parameter	Units	2042884001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent	mg/L	ND	.25	ND	0	75-125	H1,M1

SAMPLE DUPLICATE: 263782

Parameter	Units	2042884001 Result	Dup Result	RPD	Max RPD	Qualifiers
Chromium, Hexavalent	mg/L	ND	ND		20	H1

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QUALITY CONTROL DATA

Project: Maxine Mine
Pace Project No.: 2042884

QC Batch: 63714 Analysis Method: EPA 9012
QC Batch Method: EPA 9010 Analysis Description: 9012 Cyanide
Associated Lab Samples: 2042884004, 2042884005, 2042884006

METHOD BLANK: 264239 Matrix: Solid
Associated Lab Samples: 2042884004, 2042884005, 2042884006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	mg/kg	ND	1.0	09/24/16 11:35	

LABORATORY CONTROL SAMPLE: 264240

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/kg	5	5.2	104	80-120	

MATRIX SPIKE SAMPLE: 264242

Parameter	Units	2042884004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/kg	ND	5	5.1	103	75-125	

SAMPLE DUPLICATE: 264241

Parameter	Units	2042884004 Result	Dup Result	RPD	Max RPD	Qualifiers
Cyanide	mg/kg	ND	ND		20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63715 Analysis Method: EPA 9012
QC Batch Method: EPA 9010 Analysis Description: EPA 9012 Cyanide
Associated Lab Samples: 2042884001, 2042884002, 2042884003

METHOD BLANK: 264243 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	mg/L	ND	0.010	09/24/16 11:35	

LABORATORY CONTROL SAMPLE: 264244

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/L	.1	0.10	104	80-120	

MATRIX SPIKE SAMPLE: 264246

Parameter	Units	2042884001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/L	ND	.1	0.12	116	75-125	

SAMPLE DUPLICATE: 264245

Parameter	Units	2042884001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cyanide	mg/L	ND	ND		20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63794 Analysis Method: EPA 9038
QC Batch Method: EPA 9038 Analysis Description: 9038 Sulfate, Turbidimetric
Associated Lab Samples: 2042884004, 2042884005, 2042884006

METHOD BLANK: 264644 Matrix: Solid

Associated Lab Samples: 2042884004, 2042884005, 2042884006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/kg	ND	50.0	09/24/16 12:32	

LABORATORY CONTROL SAMPLE: 264645

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/kg	200	207	104	90-110	

MATRIX SPIKE SAMPLE: 264647

Parameter	Units	2042884004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/kg	3530	943	4450	97	75-125	

SAMPLE DUPLICATE: 264646

Parameter	Units	2042884004 Result	Dup Result	RPD	Max RPD	Qualifiers
Sulfate	mg/kg	3530	3590	2	20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63909 Analysis Method: EPA 9065
QC Batch Method: EPA 9065 Analysis Description: 9065 Phenolics
Associated Lab Samples: 2042884004, 2042884005, 2042884006

METHOD BLANK: 265282 Matrix: Solid

Associated Lab Samples: 2042884004, 2042884005, 2042884006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phenolics, Total Recoverable	mg/kg	ND	0.15	09/27/16 14:28	

LABORATORY CONTROL SAMPLE: 265283

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phenolics, Total Recoverable	mg/kg	2.5	2.7	109	80-120	

MATRIX SPIKE SAMPLE: 265285

Parameter	Units	40138499001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phenolics, Total Recoverable	mg/kg	<0.15	2.5	0.44	15	75-125	M1

SAMPLE DUPLICATE: 265284

Parameter	Units	40138499001 Result	Dup Result	RPD	Max RPD	Qualifiers
Phenolics, Total Recoverable	mg/kg	<0.15	ND		20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63763

Analysis Method: EPA 9065

QC Batch Method: EPA 9065

Analysis Description: 9065 Phenolics

Associated Lab Samples: 2042884001, 2042884002, 2042884003

METHOD BLANK: 264484

Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phenolics, Total Recoverable	mg/L	ND	0.0060	09/23/16 15:21	

LABORATORY CONTROL SAMPLE: 264485

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phenolics, Total Recoverable	mg/L	.1	0.11	106	80-120	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63791

Analysis Method: EPA 9251

QC Batch Method: EPA 9251

Analysis Description: 9251 Chloride

Associated Lab Samples: 2042884004, 2042884005, 2042884006

METHOD BLANK: 264632

Matrix: Solid

Associated Lab Samples: 2042884004, 2042884005, 2042884006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/kg	ND	10.0	09/24/16 10:51	

LABORATORY CONTROL SAMPLE: 264633

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/kg	1070	1080	101	90-110	

MATRIX SPIKE SAMPLE: 264635

Parameter	Units	2042884004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/kg	123	9430	9990	105	75-125	

SAMPLE DUPLICATE: 264634

Parameter	Units	2042884004 Result	Dup Result	RPD	Max RPD	Qualifiers
Chloride	mg/kg	123	94.8J		20	

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QUALITY CONTROL DATA

Project: Maxine Mine

Pace Project No.: 2042884

QC Batch: 63699 Analysis Method: ASTM D516-90,02
QC Batch Method: ASTM D516-90,02 Analysis Description: ASTM D516-9002 Sulfate Water
Associated Lab Samples: 2042884001, 2042884002, 2042884003

METHOD BLANK: 264185 Matrix: Water

Associated Lab Samples: 2042884001, 2042884002, 2042884003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/L	ND	1.0	09/22/16 13:05	

LABORATORY CONTROL SAMPLE: 264186

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	20	19.8	99	90-110	

MATRIX SPIKE SAMPLE: 264188

Parameter	Units	2042884001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	6020	10	5200	-8200	75-125	M6

SAMPLE DUPLICATE: 264187

Parameter	Units	2042884001 Result	Dup Result	RPD	Max RPD	Qualifiers
Sulfate	mg/L	6020	5960	1	20	

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QUALIFIERS

Project: Maxine Mine
Pace Project No.: 2042884

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.
ND - Not Detected at or above adjusted reporting limit.
J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
MDL - Adjusted Method Detection Limit.
PQL - Practical Quantitation Limit.
RL - Reporting Limit.
S - Surrogate
1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.
Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.
LCS(D) - Laboratory Control Sample (Duplicate)
MS(D) - Matrix Spike (Duplicate)
DUP - Sample Duplicate
RPD - Relative Percent Difference
NC - Not Calculable.
SG - Silica Gel - Clean-Up
U - Indicates the compound was analyzed for, but not detected.
N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.
Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.
TNI - The Nelac Institute

LABORATORIES

PASI-A Pace Analytical Services - Asheville
PASI-N Pace Analytical Services - New Orleans

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.
D6 The precision between the sample and sample duplicate exceeded laboratory control limits.
H1 Analysis conducted outside the EPA method holding time.
M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.
N2 The lab does not hold NELAC/TNI accreditation for this parameter.
R1 RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Maxine Mine
Pace Project No.: 2042884

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
2042884004	SLO1 SED	EPA 3050	63657	EPA 6020	63709
2042884005	REF1 SED	EPA 3050	63657	EPA 6020	63709
2042884006	BCDS SED	EPA 3050	63657	EPA 6020	63709
2042884001	SLO1 WATER	EPA 3010	63893	EPA 6020	63970
2042884002	REF1 WATER	EPA 3010	63893	EPA 6020	63970
2042884003	BCDS WATER	EPA 3010	63893	EPA 6020	63970
2042884001	SLO1 WATER	EPA 7470	63527	EPA 7470	63579
2042884002	REF1 WATER	EPA 7470	63527	EPA 7470	63579
2042884003	BCDS WATER	EPA 7470	63527	EPA 7470	63579
2042884004	SLO1 SED	EPA 7471	63591	EPA 7471	63641
2042884005	REF1 SED	EPA 7471	63591	EPA 7471	63641
2042884006	BCDS SED	EPA 7471	63591	EPA 7471	63641
2042884001	SLO1 WATER	SM 2510B	63819		
2042884002	REF1 WATER	SM 2510B	63819		
2042884003	BCDS WATER	SM 2510B	63819		
2042884001	SLO1 WATER	SM 2540C	63802		
2042884002	REF1 WATER	SM 2540C	63802		
2042884003	BCDS WATER	SM 2540C	63802		
2042884001	SLO1 WATER	SM 2540D	63666		
2042884002	REF1 WATER	SM 2540D	63666		
2042884003	BCDS WATER	SM 2540D	63666		
2042884001	SLO1 WATER	ASTM D4239-05	330128		
2042884002	REF1 WATER	ASTM D4239-05	330128		
2042884003	BCDS WATER	ASTM D4239-05	330128		
2042884004	SLO1 SED	ASTM D4239-05	330128		
2042884005	REF1 SED	ASTM D4239-05	330128		
2042884006	BCDS SED	ASTM D4239-05	330128		
2042884004	SLO1 SED	Trivalent Chromium Calculation	63632		
2042884005	REF1 SED	Trivalent Chromium Calculation	63632		
2042884006	BCDS SED	Trivalent Chromium Calculation	63632		
2042884001	SLO1 WATER	Trivalent Chromium Calculation	63633		
2042884002	REF1 WATER	Trivalent Chromium Calculation	63633		
2042884003	BCDS WATER	Trivalent Chromium Calculation	63633		
2042884004	SLO1 SED	EPA 351.2	64169	EPA 351.2	64343
2042884005	REF1 SED	EPA 351.2	64169	EPA 351.2	64343
2042884006	BCDS SED	EPA 351.2	64169	EPA 351.2	64343
2042884001	SLO1 WATER	EPA 351.2	64174	EPA 351.2	64345
2042884002	REF1 WATER	EPA 351.2	64174	EPA 351.2	64345
2042884003	BCDS WATER	EPA 351.2	64174	EPA 351.2	64345

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Maxine Mine
Pace Project No.: 2042884

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
2042884004	SLO1 SED	EPA 365.4	64170	EPA 365.4	64533
2042884005	REF1 SED	EPA 365.4	64170	EPA 365.4	64533
2042884006	BCDS SED	EPA 365.4	64170	EPA 365.4	64533
2042884001	SLO1 WATER	EPA 365.4	64171	EPA 365.4	64534
2042884002	REF1 WATER	EPA 365.4	64171	EPA 365.4	64534
2042884003	BCDS WATER	EPA 365.4	64171	EPA 365.4	64534
2042884001	SLO1 WATER	SM 4500-CI-E	63698		
2042884002	REF1 WATER	SM 4500-CI-E	63698		
2042884003	BCDS WATER	SM 4500-CI-E	63698		
2042884004	SLO1 SED	SM 4500-NH3 B	64562	SM 4500-NH3 D	64635
2042884005	REF1 SED	SM 4500-NH3 B	64562	SM 4500-NH3 D	64635
2042884006	BCDS SED	SM 4500-NH3 B	64562	SM 4500-NH3 D	64635
2042884001	SLO1 WATER	SM 4500-NH3 B	64605	SM 4500-NH3 G	64683
2042884002	REF1 WATER	SM 4500-NH3 B	64605	SM 4500-NH3 G	64683
2042884003	BCDS WATER	SM 4500-NH3 B	64605	SM 4500-NH3 G	64683
2042884004	SLO1 SED	SM 4500-NO3 F	63792	SM 4500-NO3 F	63875
2042884005	REF1 SED	SM 4500-NO3 F	63792	SM 4500-NO3 F	63875
2042884006	BCDS SED	SM 4500-NO3 F	63792	SM 4500-NO3 F	63875
2042884001	SLO1 WATER	SM 4500-NO3 F	64820		
2042884002	REF1 WATER	SM 4500-NO3 F	64820		
2042884003	BCDS WATER	SM 4500-NO3 F	64820		
2042884004	SLO1 SED	EPA 7196	63793	EPA 7196	63877
2042884005	REF1 SED	EPA 7196	63793	EPA 7196	63877
2042884006	BCDS SED	EPA 7196	63793	EPA 7196	63877
2042884001	SLO1 WATER	EPA 7196	63584		
2042884002	REF1 WATER	EPA 7196	63584		
2042884003	BCDS WATER	EPA 7196	63584		
2042884004	SLO1 SED	EPA 9010	63714	EPA 9012	63741
2042884005	REF1 SED	EPA 9010	63714	EPA 9012	63741
2042884006	BCDS SED	EPA 9010	63714	EPA 9012	63741
2042884001	SLO1 WATER	EPA 9010	63715	EPA 9012	63742
2042884002	REF1 WATER	EPA 9010	63715	EPA 9012	63742
2042884003	BCDS WATER	EPA 9010	63715	EPA 9012	63742
2042884004	SLO1 SED	EPA 9038	63794	EPA 9038	63878
2042884005	REF1 SED	EPA 9038	63794	EPA 9038	63878
2042884006	BCDS SED	EPA 9038	63794	EPA 9038	63878
2042884004	SLO1 SED	EPA 9065	63909	EPA 9065	63953
2042884005	REF1 SED	EPA 9065	63909	EPA 9065	63953
2042884006	BCDS SED	EPA 9065	63909	EPA 9065	63953
2042884001	SLO1 WATER	EPA 9065	63763	EPA 9065	63827
2042884002	REF1 WATER	EPA 9065	63763	EPA 9065	63827
2042884003	BCDS WATER	EPA 9065	63763	EPA 9065	63827

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Maxine Mine

Pace Project No.: 2042884

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
2042884004	SLO1 SED	EPA 9251	63791	EPA 9251	63876
2042884005	REF1 SED	EPA 9251	63791	EPA 9251	63876
2042884006	BCDS SED	EPA 9251	63791	EPA 9251	63876
2042884001	SLO1 WATER	ASTM D516-90,02	63699		
2042884002	REF1 WATER	ASTM D516-90,02	63699		
2042884003	BCDS WATER	ASTM D516-90,02	63699		

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WO#: 2042884



CHAIN
The Chain-

Pace Analytical

ment
completed accurately.

7720

Section A
Required Client Information:
Company: Black Warrior Riverkeeper
Address: 712 37th Street South
Birmingham, AL 35222
Email: nbrooke@blackwarriorriver.org
Phone: 205-458-0085
Fax:
Requested Due Date:

Section B
Required Project Information:
Report To: Nelson Brooke
Copy To:
Purchase Order #:
Project Name: Maxine Mine
Project #:
Attention:
Company Name: Same
Address:
Pace Project Manager: melissa.machaughn@pacealabs.com
Pace Profile #:
Regulatory Agency:
State / Location: AL

Page: 1 Of 2

ITEM #	MATRIX CODE Drinking Water Water Waste Water Product Soils/solid Oil Wipe Other Tissue	CODE DW WT WW P SL OL MP OT TS	SAMPLE ID One Character per box. (A-Z, 0-9 /, -) Sample IDs must be unique	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives										Analyses Test Y/N	N	Requested Analysis Filtered (Y/N)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
						DATE	TIME			DATE	TIME	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other			Cl, Sulfate and conductivity	Cl, Cyanide, Cr VI, Hg	Cyanide	Hexavalent Chromium	Metals by 6020 and Hg	boron isotopes - to Pittsburgh	boron isotopes - to Pittsburgh	Sulfur to Carolina	Ammonia, TKN, N+N, phos	TKN, Ammonia, N+N	Phos, sulfate, metals	TDS and TSS	Residual Chlorine (Y/N)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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RELINQUISHED BY / AFFILIATION: Barry Sukkin / BURK
DATE: 9/20/16 1045
TIME: 9:21-16 0820
ACCEPTED BY / AFFILIATION: J. Muller / Pace
DATE: 9/21/16 0820
TIME: 1:20
SAMPLE CONDITIONS: X Y

RECEIVED ON: 9/21/16
TEMP IN C: 21
Sealed (Y/N): X
Cooler (Y/N): Y
Samples (N):

SAMPLER NAME AND SIGNATURE: Barry Sukkin
PRINT Name of SAMPLER: Barry Sukkin
SIGNATURE of SAMPLER: Barry Sukkin
DATE Signed: 9/20/16

*SLO1 Sed Boron isotope done at 13:15pm
X * See bottle labels for preservatives

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A			Section B			Section C			Section D														
Required Client Information:			Required Project Information:			Invoice Information:			Requested Analysis Filtered (Y/N)														
Company: Black Warrior Riverkeeper			Report To: Nelson Brooks			Attention:			Company Name: <u>Solve</u>														
Address: 712 37th Street South			Copy To:			Address:			Pace Quote:														
Birmingham, AL 35222			Purchase Order #:			Pace Project Manager:			Regulatory Agency:														
Email: nbrooke@blackwarriorriver.org			Project Name: Maxine Mine			melissa.mactaughton@pacelabs.com			State / Location: AL														
Phone: 205-458-0065			Project #:			Pace Profile #:																	
Requested Due Date:																							
#	ITEM	MATRIX	CODE	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Y/N	Sulfate	Sulfur	Phenol Total	Phenolics Total	Residual Chlorine (Y/N)
				START	END																		
13	DEPT Water	Drinking Water	DW	7/20/16	10:15 am	WT																	
14	SLO1 Water	Waste Water	WW	7/20/16	10:15 am	WT																	
15	REF1 Water	Product	P	7/20/16	10:15 am	WT																	
16	BCDS Water	Soil/Solid	SL	7/20/16	10:15 am	WT																	
17	BCUS Water	Oil	OL	7/20/16	10:15 am	WT																	
18	SLO1 Sed	Wipe	WP	7/20/16	10:15 am	WT																	
19	DEPT Sed	Air	AR	7/20/16	10:15 am	WT																	
20	REF1 Sed	Other	OT	7/20/16	10:15 am	WT																	
21	BCUS Sed	Tissue	TS	7/20/16	10:15 am	WT																	
22	BCDS Sed			7/20/16	10:15 am	WT																	
23																							
24																							
ADDITIONAL COMMENTS: Metals: Tin, Trivalent Cr, Vanadium, Al, Sb, As, Ba, Be, Bi, Cd, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Mo, Ni, Se, Ag, Sr, Tl, Ti, V, Zn, Ca, K, Si, Na ** See bottle labels for preservatives																							
SAMPLE CONDITIONS: Received on ice (Y/N) Sealed Cooler (Y/N) Custody (Y/N) Samples Intact (Y/N)																							
TEMP in C: 1-2 21 4 Y																							
ACCEPTED BY / AFFILIATION: J. Miller / Pace 9-21-16 0820																							
DATE: 9-21-16 0820																							
TIME: 0820																							
DATE: 9/20/16																							
TIME: 0820																							
SIGNATURE: Barry Seltzer																							
PRINT Name of SAMPLER: Barry Seltzer																							
SIGNATURE of SAMPLER: Barry Seltzer																							
DATE: 9/20/16																							

W0# : 2042884

PM: MM1

Due Date: 10/05/16

CLIENT: 20-Bik Warri

1000 Riverbend, Blvd., Suite F
St. Rose, LA 70087

Sample Condition Upon Receipt

Project #: 20

 Courier: ☐ Pace Courier ☐ Hired Courier ☒ Fed X ☐ UPS ☐ DHL ☐ USPS ☐ Customer ☐ Other

Custody Seal on Cooler/Box Present: [see COC]

Custody Seals intact: ☒ Yes ☐ NoThermometer
Used:

- ☐
- Therm Fisher IR 5
-
- ☐
- Therm Fisher IR 6
-
- ☒
- Therm Fisher IR 7

Type of Ice:

Wet Blue None

Samples on ice: [see COC]

Cooler Temperature: [see COC]

Temp should be above freezing to 6°C

Date and Initials of person examining
contents: 9-21-16

Temp must be measured from Temperature blank when present

Comments:

Temperature Blank Present?"	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	1
Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2
Chain of Custody Complete:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4
Sampler Name & Signature on COC:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	5
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	6
Sufficient Volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	7
Correct Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8
Filtered vol. Rec. for Diss. tests	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	9
Sample Labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10
All containers received within manufacture's precautionary and/or expiration dates.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	11
All containers needing chemical preservation have been checked (except VOA, coliform, & O&G).	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12
All containers preservation checked found to be in compliance with EPA recommendation.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	13
		If No, was preservative added? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If added record lot no.: HNO3 _____ H2SO4 _____
Headspace in VOA Vials (>6mm):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	14
Trip Blank Present:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	15

Client Notification/ Resolution:

Person Contacted: _____

Date/Time: _____

Comments/ Resolution: _____



Pace Analytical Energy Services LLC
220 William Pitt Way
Pittsburgh, PA 15238
Phone: (412) 826-5245
Fax: (412) 826-3433

December 15, 2016

Melissa MacNaughton
Pace Analytical Services, Inc.
1000 Riverbend Blvd.
Suite F
Saint Rose, LA 70087

RE: **MAXINE MINE / 2042884**

Pace Workorder: 20387

Dear Melissa MacNaughton:

Enclosed are the analytical results for sample(s) received by the laboratory on Friday, September 23, 2016. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report. This report was reissued on December 15, 2016 to correct the receipt form.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in cursive script that reads 'Ruth Welsh'.

Ruth Welsh 12/14/2016
Ruth.Welsh@pacelabs.com

Customer Service Representative

Enclosures

As a valued client we would appreciate your comments on our service.
Please email PAESfeedback@pacelabs.com.

Total Number of Pages 15

Report ID: 20387 - 873851

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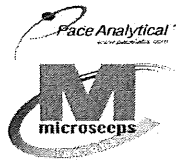
LABORATORY ACCREDITATIONS & CERTIFICATIONS

Accreditor:	Pennsylvania Department of Environmental Protection, Bureau of Laboratories
Accreditation ID:	02-00538
Scope:	NELAP Non-Potable Water and Solid & Hazardous Waste
Accreditor:	West Virginia Department of Environmental Protection, Division of Water and Waste Management
Accreditation ID:	395
Scope:	Non-Potable Water
Accreditor:	South Carolina Department of Health and Environmental Control, Office of Environmental Laboratory Certification
Accreditation ID:	89009003
Scope:	Clean Water Act (CWA); Resource Conservation and Recovery Act (RCRA)
Accreditor:	NELAP: New Jersey, Department of Environmental Protection
Accreditation ID:	PA026
Scope:	Non-Potable Water; Solid and Chemical Materials
Accreditor:	NELAP: New York, Department of Health Wadsworth Center
Accreditation ID:	11815
Scope:	Non-Potable Water; Solid and Hazardous Waste
Accreditor:	State of Connecticut, Department of Public Health, Division of Environmental Health
Accreditation ID:	PH-0263
Scope:	Clean Water Act (CWA) Resource Conservation and Recovery Act (RCRA)
Accreditor:	NELAP: Texas, Commission on Environmental Quality
Accreditation ID:	T104704453-09-TX
Scope:	Non-Potable Water
Accreditor:	State of New Hampshire
Accreditation ID:	299409
Scope:	Non-potable water
Accreditor:	State of Georgia
Accreditation ID:	Chapter 391-3-26
Scope:	As per the Georgia EPD Rules and Regulations for Commercial Laboratories, PAES is accredited by the Pennsylvania Department of Environmental Protection Bureau of Laboratories under the National Environmental Laboratory Approval Program (NELAC).



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Pittsburgh, PA 15238
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Fax: (412) 826-3433

SAMPLE SUMMARY

Workorder: 20387 MAXINE MINE / 2042884

Lab ID	Sample ID	Matrix	Date Collected	Date Received
203870001	SLO1 WATER	Water	9/20/2016 10:45	9/23/2016 15:00
203870002	REF1 WATER	Water	9/20/2016 12:15	9/23/2016 15:00
203870003	BCDS WATER	Water	9/20/2016 15:30	9/23/2016 15:00
203870004	SLO1	Soil	9/20/2016 10:45	9/23/2016 15:00
203870005	REF 1 SED	Soil	9/20/2016 12:15	9/23/2016 15:00
203870006	BCDS SED	Soil	9/20/2016 15:30	9/23/2016 15:00

Report ID: 20387 - 873851

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 Phone: (412) 826-5245
 Fax: (412) 826-3433

ANALYTICAL RESULTS

Workorder: 20387 MAXINE MINE / 2042884

Lab ID: 203870001 Date Received: 9/23/2016 15:00 Matrix: Water
 Sample ID: SLO1 WATER Date Collected: 9/20/2016 10:45

Parameters	Results	Units	PQL	MDL	DF	Analyzed	By	Qualifiers
Subcontracted Work - SCUP								u
Analysis Desc: D180 Analytical Method: D180								
Boron 11 Isotope	Complete							s

Report ID: 20387 - 873851

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ANALYTICAL RESULTS

Workorder: 20387 MAXINE MINE / 2042884

Lab ID: 203870002
 Sample ID: REF1 WATER

Date Received: 9/23/2016 15:00 Matrix: Water
 Date Collected: 9/20/2016 12:15

Parameters	Results	Units	PQL	MDL	DF	Analyzed	By	Qualifiers
Subcontracted Work - SCUP								U
Analysis Desc: D18O Analytical Method: D18O								
Boron 11 Isotope	Complete							S

Report ID: 20387 - 873851

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ANALYTICAL RESULTS

Workorder: 20387 MAXINE MINE / 2042884

Lab ID: 203870003
 Sample ID: BCDS WATER

Date Received: 9/23/2016 15:00 Matrix: Water
 Date Collected: 9/20/2016 15:30

Parameters	Results	Units	PQL	MDL	DF	Analyzed	By	Qualifiers
Subcontracted Work - SCUP								u
Analysis Desc: D18O		Analytical Method: D18O						
Boron 11 Isotope	Complete							s

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ANALYTICAL RESULTS

Workorder: 20387 MAXINE MINE / 2042884

Lab ID: **203870004**
 Sample ID: **SLO1**

Date Received: 9/23/2016 15:00 Matrix: Soil
 Date Collected: 9/20/2016 10:45

Parameters	Results	Units	PQL	MDL	DF	Analyzed	By	Qualifiers
Subcontracted Work - SCIT								X
Analysis Desc: D18O		Analytical Method: D18O						
Boron 11 Isotope	Complete							S

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ANALYTICAL RESULTS

Workorder: 20387 MAXINE MINE / 2042884

Lab ID: 203870005

Date Received: 9/23/2016 15:00 Matrix: Soil

Sample ID: REF 1 SED

Date Collected: 9/20/2016 12:15

Parameters	Results	Units	PQL	MDL	DF	Analyzed	By	Qualifiers
Subcontracted Work - SCIT								X
Analysis Desc: D18O		Analytical Method: D18O						
Boron 11 Isotope	Complete							S

Report ID: 20387 - 873851

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ANALYTICAL RESULTS

Workorder: 20387 MAXINE MINE / 2042884

Lab ID: 203870006

Date Received: 9/23/2016 15:00 Matrix: Soil

Sample ID: BCDS SED

Date Collected: 9/20/2016 15:30

Parameters	Results	Units	PQL	MDL	DF	Analyzed	By	Qualifiers
Subcontracted Work - SCIT								X
Analysis Desc: D18O Analytical Method: D18O								
Boron 11 Isotope	Complete							S

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ANALYTICAL RESULTS QUALIFIERS

Workorder: 20387 MAXINE MINE / 2042884

DEFINITIONS/QUALIFIERS

MDL	Method Detection Limit. Can be used synonymously with LOD; Limit Of Detection.
PQL	Practical Quantitation Limit. Can be used synonymously with LOQ; Limit Of Quantitation.
ND	Not detected at or above reporting limit.
DF	Dilution Factor.
S	Surrogate.
RPD	Relative Percent Difference.
% Rec	Percent Recovery.
U	Indicates the compound was analyzed for, but not detected at or above the noted concentration.
J	Estimated concentration greater than the set method detection limit (MDL) and less than the set reporting limit (PQL).
u	Subcontracted to University of Pittsburgh
x	Subcontracted to Isotech
s	Subcontracted; for any related quality nonconformance see additional report(s)



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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: 20387 MAXINE MINE / 2042884

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
203870004	SLO1			D18O	SCIT/1020
	<i>Subcontracted to Isotech</i>				
203870005	REF 1 SED			D18O	SCIT/1020
	<i>Subcontracted to Isotech</i>				
203870006	BCDS SED			D18O	SCIT/1020
	<i>Subcontracted to Isotech</i>				
203870001	SLO1 WATER			D18O	SCUP/1014
	<i>Subcontracted to University of Pittsburgh</i>				
203870002	REF1 WATER			D18O	SCUP/1014
	<i>Subcontracted to University of Pittsburgh</i>				
203870003	BCDS WATER			D18O	SCUP/1014
	<i>Subcontracted to University of Pittsburgh</i>				

Report ID: 20387 - 873851

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Client: Pace Analytical New Orleans
1000 Riverbend Blvd, Suite F
St. Rose, LA 70087
Tel: 504-469-0333
Report to: Melissa MacNaughton
Project: Maxine Mine
Project #: 2042884
Email: melissa.macnaughton@pacelabs.com

CSIA Center of Excellence
Pace Analytical Energy Services
220 William Pitt Way
Pittsburgh
Pennsylvania 15238
United States
CSIA Work Order # 20387
Tel: 412.826.5245

REPORT OF FORENSICS ISOTOPIC ANALYTICAL RESULTS

Date Received: 9/23/2016
Date Reported: 12/14/2016

Samples submitted for $^{11}\text{B}/^{10}\text{B}$ (‰ NBS) stable isotope ratios of Boron

Pace CSIA Lab ID	Client's Sample ID Description	$\delta^{11}\text{B}$ Boron
20387-1	SLO1 WATER	18.5
20387-2	REF1 WATER	16.9
20387-3	BCDS WATER	24.6
20387-4	SLO1	^u
20387-5	REF1 SED	15.7
20387-6	BCDS SED	22.4

^u - there was no stable signal corresponding to the target analyte

Boron isotopes (^{11}B) by Thermal Ionization Mass Spectrometer (TIMS) reported against NBS SRM 951

Quality Control STDs	$\delta^{11}\text{B}$ Boron
QC-1	
QC-2	
Mean	
Analytical Precision (1 σ)	<1.00

Pace CSIA Forensic Isotope Services

Product or Dissolved Organics: Chlorinated Solvents, Oil, Extract, Fraction and Kerogen

2D-CSIA for 1,4-D PCE TCE DCE VC TCA DCA CT CF DCM CA CM MTBE TBA BTEX CH₄ and more; Bulk ^{13}C , ^2H , ^{18}O , ^{34}S , and ^{15}N

Gas Sample

Gas Composition and 2D-CSIA of ^{13}C and ^2H of C1 to C5; ^{13}C of CO₂; ^{14}C of C1 and CO₂; ^{34}S of H₂S; ^{15}N and ^{18}O of N₂O gas

Water and Dissolved Inorganics

^2H , ^3H and ^{18}O ; ^{34}S and ^{18}O of dissolved sulfate; ^{34}S of dissolved H₂S

^{15}N and ^{18}O of dissolved Nitrate; ^{15}N of Ammonia; ^{13}C of dissolved CO₂ and Carbonate/Bicarbonate

Soil and Minerals

^{13}C , ^{18}O , ^{15}N , ^{34}S , D/H; ^{14}C of carbonate or organics

Post-Analysis Forensic Isotope Data Interpretation

Chain of Custody

20387



Workorder: 2042884

Workorder Name: Maxine Mine

Owner Received Date: 9/21/2016 Results Requested By: 10/5/2016

Report To

Melissa MacNaughton
Pace Analytical New Orleans
1000 Riverbend Blvd
Suite F
St. Rose, LA 70087
Phone (504)469-0333

Subcontract To

Pace Analytical Pittsburgh
1638 Roseytown Road
Suites 2,3, & 4
Greensburg, PA 15601
Phone (724)850-5600

Requested Analysis

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Preserved Containers	LAB USE ONLY
1	SLO1 WATER	PS	9/20/2016 10:45	2042884001	Water	Unpreserved 2	
2	REF1 WATER	PS	9/20/2016 12:15	2042884002	Water	1	
3	BCDS WATER	PS	9/20/2016 15:30	2042884003	Water	1	
4	SLO1	PS	9/20/2016 10:45	2042884004	Solid	1	
5	REF 1 SED	PS	9/20/2016 12:15	2042884005	Solid	1	
6	BCDS SED	PS	9/20/2016 15:30	2042884006	Solid	1	

Comments

Transfers	Released By	Date/Time	Received By	Date/Time
1	Melissa MacNaughton	9-21-16 17:00	Pace	9-22-16 09:50
2	Melissa MacNaughton	9/22/16 17:00	Pace	9/23/16 12:45
3	Melissa MacNaughton	9/23/16 14:00	Pace	9/23/16 15:00

Cooler Temperature on Receipt	N/A °C	Custody Seal (Y) or N	Received on Ice (Y) or N	Samples Intact (Y) or N
-------------------------------	--------	-----------------------	--------------------------	-------------------------

***In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC document.

This chain of custody is considered complete as is since this information is available in the owner laboratory.

10C

Cooler Receipt Form

Client Name: Pace - LA Project: Maxine Mine Lab Work Order: 20387

A. Shipping/Container Information (circle appropriate response)

Courier: FedEx UPS USPS Client Other: Pace G Air bill Present: Yes No

Tracking Number: _____

Custody Seal on Cooler/Box Present: Yes No Seals Intact: Yes No

Cooler/Box Packing Material: Bubble Wrap Absorbent Foam Other: _____

Type of Ice: Wet Blue None Ice Intact: Yes Melted

Cooler Temperature: 10C Radiation Screened: Yes No Chain of Custody Present: Yes No

Comments: _____

B. Laboratory Assignment/Log-in (check appropriate response)

	YES	NO	N/A	Comment Reference non-Conformance
Chain of Custody properly filled out	✓			
Chain of Custody relinquished	✓			
Sampler Name & Signature on COC			<u>ECU</u> X	
Containers intact	✓		<u>10-15/16</u>	
Were samples in separate bags		✓		
Sample container labels match COC		✓		
Sample name/date and time collected		✓		
Sufficient volume provided	✓			
PAES containers used			✓	
Are containers properly preserved for the requested testing? (as labeled)			✓	
If an unknown preservation state, were containers checked? Exception: VOA's coliform			✓	If yes, see pH form.
Was volume for dissolved testing field filtered, as noted on the COC? Was volume received in a preserved container?			✓	

Comments: _____

Cooler contents examined/received by: LG Date: 9.23.16

Project Manager Review: EW Date: 9-26-16

NON-CONFORMANCE FORM

PAES Work Order #: 20387

Date: 9.23.16 Time of Receipt: 1500 Receiver: CS

Client: Pace

REASON FOR NON-CONFORMANCE:

SLO1: Time on original label was 13:15

ACTION TAKEN:

Client name: _____ Date: _____ Time: _____

Logged in per COC

Customer Service Initials: RW

Date: 9-26-16